ACTION PLAN: FORCED AIR SYSTEM

HAYWARD™ SCORE

Forced air systems are designed to control the temperature in your home, but they aren't designed to prevent dust and odors from circulating throughout your home. Action is needed to prevent forced air from polluting the air your breathe.

Improving the quality of your indoor air requires attention to your forced air system - because the air moving through your system is usually not as clean as you think it is. There are three things you must determine with forced air systems to act effectively to make your house more supportive of health and to improve your Hayward Score. Completion of all steps, in the order listed below, will provide maximum benefit.

1. Identify the characteristics of the heating and cooling forced air system(s) in your home. The type of system, configuration, location, ducting type, air tightness, settings, and venting are all important to understand.

2. Assess the conditions of the system characteristics. Some may need to be cleaned, others adjusted, occasionally repaired, or replaced.

3. Alter or repair where necessary. Determine which you can do and the ones where you should use a professional.

IMPLEMENTATION MANUAL

OVERVIEW

The air in your forced air system circulates through living space, crawlspace, and some garage. So even if you don't go into those spaces, the air comes to you. It also carries mold, pest excrement, dust) through the ducting from all locations.

Appropriate filtration, sealed ducting, and balanced circulation can improve the air in the breathing zone.

This manual is designed to help you address the issues for the proper functioning of the forced air system in your house. Although most of these actions and their combinations are not new, the reasons for conducting them are new to many contractors. They have been trained to comply with local building codes and general industry standards, not these higher standards and best practices which include the impact of the house on the people who live in them.

NOTE ON BUILDING CODES:

Code is the minimum standard a builder can legally build to in order to protect from physical hazard. The codes are not written to create healthy air in your house.

step 1: Identify system characteristics

step 2: Assess the condition of each part of the system

step 3: Alter, clean, and/or repair as necessary

STEP 1 & 2 IDENTIFY THE CHARACTERISTICS AND ASSESS THE CONDTIONS OF THE FORCED AIR SYSTEM

Forced air systems are commonly referred to as “furnaces,” which supplies heat during cold weather. But central air conditioning is also a forced air system, and is usually in the same physical cabinet as the heat source. Professionals rename this as a “mechanical system,” thereby referring to any forced air system regardless of whether it supplies hot air, cold air, or both.

It is important to understand key characteristics of your system including:

- Heat source (combustion, electric, heat pump)
- Ducting type (metal, duct board, flex duct)
- Ducting pathways
- Air conditioning
- Filters
- Location

HEAT SOURCE

Forced air systems heat air by one of several methods. The most common is by the combustion of natural gas, propane, or fuel oil. The flame must have the correct mixture of fuel and air to burn efficiently and not produce excess combustion gasses, especially carbon monoxide. (Heat from electric coils or a heat pump do not have combustion). The heat created by the flame warms a metal assembly called the heat exchanger. As the forced air blower moves the air over the heat exchanger the air is warmed and then circulated throughout the house.

WARNING

To avoid health and safety hazards it is critically important to have a properly set flame, sufficient exhaust to remove carbon monoxide, plus make-up air to replace the oxygen burned in he flame.

DUCT TYPE

The air is blown to the rooms of the house through air ducts. These can be made from smooth metal, metal with insulation inside, duct board which is compressed fiberglass, or flex duct – round plastic tubing with a spiral wire to hold its shape and keep the pathway open.

After the air moves throughout the house it needs to circulate back to the mechanical system. This is called a return duct or a cold air return. These can be made of the same materials as the supply ducts, but can also just be the space between two studs in a wall or two joists in the floor, and thus difficult to clean.

It is critical that interior surfaces of ducting remain clean and dry. This is easy when the ducts have smooth, straight metal surfaces, more difficult due to convolutions with flex duct, and almost impossible when the ducting is lined with insulation or are actually wood cavities in floors or walls. Cleaning these can help, but they won't ever be completely clean, which may cause issues for people who breathe the air. Ducting should also be free of water marks and accumulated layers of dust.

Finally, because leaky ducting will pull air from the space where it is located (i.e., dirt floor crawlspace, damp basement), the ducting should be air tight. A high temperature foil duct tape (not the gray fabric type) or a high temperature, water-based duct caulk should be used to seal all corners, seams, connections, and joints.

AIR CONDITIONING

Central A/C uses the same ducting as for heating. The difference is instead of a heat exchanger for air to move over, it has cooling coils to chill the air and remove humidity.

In an A/C system, moisture collects on the cooling coils and in the drip pan below them. The cooling coils remove humidity in the air by condensation, wetting the coils, dust, dirt, dander, hair, or other particles that may have collected on the surface. The combination of these “food” sources and frequent moisture can germinate and grow bacteria and mold.

When the ducts are cleaned the cooling coils and drip pan should also be inspected and cleaned as needed.

FORCED AIR FILTERS

To help keep the ducting and blower clean, and to improve the cleanliness of the air, a proper filter must be installed in the air pathway of the system. There are several types of filters available, each with their own strengths and weaknesses. Electronic filters are best when scrupulously clean, but quickly become less effective as the grid becomes coated in dust. Membrane filters work best as they collect dust and partially clog the pores, making them effectively smaller. HEPA filters have pores too small for the standard blower to move enough air through, and thus cannot be used like other filters. They need their own cabinet with their own blower. Selection of what is best for your situation can become complex and often confusing.

A MERV 11 or 13 1″ filter needs to be changed every 1-2 months. A MERV 16 requires 4″ and can usually last 12 months. A properly installed filter will not only increase the time between duct cleanings, but will significantly reduce the potential for the growth of bacteria and mold on the A/C coils and drip pan.

SYSTEM LOCATION

Forced air systems are most commonly located in the basement or crawlspace. Less frequent locations are in the garage, attic, or a small closet-like room inside the living space.

The location of your forced air system directly influences what is in the air that moves throughout the house. Air in the room or space where the forced air system is located is drawn into leaky ducting, which is often not adequately sealed, through normal convection, the "stack" effect, or the negative pressure that is created when the blower is running.

If your forced air system is located in the garage, your forced air system will draw in the chemicals from whatever is in the garage - paint, fertilizer, pesticides, and cleaning supplies in addition to auto and lawnmower emissions. If your forced air system is in the crawlspace, it will draw in dust, dirt, soil gasses, pesticides, mold etc. These pollutants then get circulated throughout the house. While you may think you aren't often exposed to the air in your crawlspace or garage, in reality you are exposed every day as your forced air system brings it directly to you.

WOULD YOU LET YOUR BABY NAP IN YOUR GARAGE?

No? Well if the forced air system in your garage isn't cleaned, maintained, and properly sealed the garage air is coming directly to your baby's nursery.

STEP 3: ALTER, CLEAN, AND REPAIR WHEN NECESSARY

For safety, health, and energy efficiency, it is important to keep your forced air system in excellent working order. Some actions, such as changing filters are easily DIY. For other actions, such as adjusting the flame and cleaning the ducting, hiring a professional is required.

Depending on what you discovered in Steps 1 and 2, your action items may include:

- Adjusting heating and/or cooling temperatures
- Installing/replacing filters
- Cleaning the interior surfaces of the ducting and blower
- Ensuring exhaust meets code requirements
- Ensure combustion flame is correctly set
- Clean A/C drip pan and coils
- Tightly seal all ducting corners, connections, joints, and seams with a non-toxic, high-temperature duct tape or caulk.

STEP 2: REPAIR (AS NEEDED)

- Fix all sources of water leaks and condensation
- Fix or replace all broken and/or rotted structures
- Remove visible mold and water stains from wall, flooring, and ceiling surfaces
- Install perimeter drainage and sump pumps if necessary

STEP 3: ADD MECHANICAL VENTILATION

Install a small mechanical venting system in the basement.

- If an HRV or ERV is used then the airflow must be designed and installed according to manufacturers specifications. See also, the Ventilation Action Plan

MAINTENACE MANUAL

GOAL: PRESERVE THE IMPROVEMENTS AND PROTECT AGAINST NEW ISSUES

Maintaining your forced air system is critically important for continuing indoor air quality. Because it is the circulation system of the house, a problem in one spot, or with the system itself, quickly gets distributed throughout the house. Construction, new pets, or cable tv installation, can alter maintenance is requirement.

KEY MAINTENANCE STEPS:

Replace the MERV 11 Or 13 filter monthly during heating and cooling season., MERV 16 annually. Duct cleaning typically is needed every 5-15 years. If you have pets, wind-blown dust, or high household occupancy, every 5 years may be needed.

TIP!

If you don't have them already, invest in CO alarms nstalled where they can be heard throughout the house, especially in bedrooms.

CHECKLIST

Keep this checklist handy as you move through each of the steps If you need more details, refer to the Forced Air Implementation Manual.

It is critical to execute each step in the order listed and not to skip anything.

STEP 1: DENTIFY THE CHARACTERISTICS OF THE FORCED AIR SYSTEM

Make sure you can answer all of the following questions. You may need to check your owner's manual if you aren't sure.

- ○ Does your forced air system provide heating, cooling, or both?

- ○ Is your heat source combustion by gas or fuel oil, from electric heaters, or a heat pump?

- Does your central A/C have cooling coils inside the cabinet with the compressor split to the outside?

- Where is your forced air system located? Common locations for the mechanical forced air system are in the attic, basement, crawlspace, garage, or a small closet-like room inside the living space.

- Identify the type of ducting. Is it smooth metal, insulation inside, duct board, flex duct?

- Determine the structural pathways through the house for both the supply and the return ducting.

STEP 2: ASSESS THE CONDITION OF THE VARIOUS CHARACTERISTICS OF THE FORCED AIR SYSTEM

It is important for efficiency, health, and safety that the controls for your forced air system are properly set, mechanics are in good working order, and ducting is clean. We recommend bringing in an heating/air conditioning specialist to ensure that your system meets the following requirements.

- ○ The heated air should be at the recommended temperature for the equipment.
- ○ The chilled air should be at recommended temperature for the equipment.
- ○ The combustion flame should be correctly set to produce maximum efficiency and lowest combustion by products.
- ○ The combustion exhaust should meet or exceed code standards.

- The make-up air for the combustion process should be properly located and with sufficient air flow to meet code requirements.
- The blower blades, blower compartment, and interior surfaces of ducting should be clean and free of accumulated layers of dust and debris.
- A filter should be installed and have a MERV rating of 11 (or higher).
- The ducting, regardless of type, should be free of water marks and suspected mold growth.
- The ducting should have all joints, corners, connections, and seams sealed air tight.

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STEP 3: ALTER, CLEAN, AND REPAIR WHEN NECESSARY

For all steps except filter replacement, hire a professional heating/air conditioning contractor.

- Install and periodically replace the air filter. Filter should be MERV 11 or higher.
- Adjust the temperature of the hot and cold air produced by the system.
- Professionally clean the interior surfaces of the ducting and blower.
- Insure the exhaust vent meets code requirements (which differ based on location).

- Adjust combustion for correct flame.
- Clean A/C drip pan and cooling coils. Disinfect if necessary.
- Seal all ducting joints, corners, connections, and seams with either a high temperature duct tape or a high temperature caulk.