

FACTS ABOUT FIBER GLASS

from NAIMA Air Handling Committee



Other fact sheets are available from NAIMA concerning the health aspects of fiber glass, rock wool and slag wool.

Introduction

There are measurable benefits associated with insulated heating, ventilating, and air conditioning (HVAC) ducts: conditioned air delivery becomes more efficient, occupant comfort is improved, energy is conserved, and the ducts operate more cost-effectively with less noise.

The best way to assure that the HVAC system will provide these benefits on a continual basis is by employing a regular system maintenance schedule. This, along with a high-efficiency filtration system, assures protection of both HVAC system components and the building occupants.

Improper maintenance of the HVAC system, including the duct system, can lead to an accumulation of dirt, dust, and moisture which can restrict air flow and jeopardize the quality of the indoor air.

As always, prevention is the best solution. The Sheet Metal and Air Conditioning Contractors National

Glass Fiber Air Transmission Systems: Cleaning Fibrous Glass or Lined Sheet Metal Ducts

Association (SMACNA) recommends system design and maintenance procedures in its publication *Indoor Air Quality*. The procedures include inspection, detection, and repair of probable sources of moisture and are consistent with those recommended in ASHRAE Standard 62-1981 "Ventilation for Acceptable Indoor Air Quality" and The Environmental Protection Agency's (EPA) *Building Air Quality: A Guide For Facility Owners And Building Managers*.

In some cases, it may be too late for prevention, and system cleaning is deemed necessary. If this is the case, it's important to understand the cleaning practices that will ensure maintenance of an insulated duct system's structural and functional integrity. The air distribution system needs to be opened, cleaned, re-closed, and returned to service with its thermal, acoustical, and airtightness properties intact.

In NAIMA's manual, *Cleaning Fibrous Glass Insulated Air Duct Systems*, there is an extensive dis-

ussion of this issue and recommended procedures. The paragraphs that follow cover the main points of that discussion.

When to Clean

The cleaning of the HVAC system, including the air distribution ducts, is being given increased attention as the concern for understanding and improving indoor air quality continues.

Before the decision is reached to clean a duct system, all potential causes of any air quality problem should be thoroughly investigated in a total environmental "check-up." Immediately observable items such as housekeeping, location, and equipment use/maintenance should be checked first. To be complete, both outdoor air factors (pollutants and filtration effectiveness) and indoor air factors (fumes, aerosols, volatile organic compounds) should be investigated as possible sources of indoor air quality concerns.

Prior to cleaning, a careful inspection of the entire HVAC system should be made. Inspection should include all equipment located within the airstream: central air handling units, variable air volume units, in-line electric heaters, coils, filters, humidifiers, drain systems and the duct work. When inspecting the duct work, a light film of dust is generally present (and to be expected) on the inside (airstream) surfaces of all kinds of ducts. If, upon ductwork inspection, there is evidence of amplified microbial growth on the surface of the sheet metal or fiber glass lining, the problem cannot be totally corrected until the source of contamination and the conditions that led to the

amplified growth are identified and remedied.

When ductwork is opened for inspection or to allow the entry of cleaning equipment, any and all access should be through existing openings such as access doors and grills, register, and diffuser openings whenever possible.

However, in nearly all cases, it will be necessary to cut through duct walls in order to insert cleaning equipment where locations far from existing openings will have to be cleaned. It should rarely be necessary for workers to enter the duct system themselves, either for inspection purposes or to perform cleaning work. In all cases, workers should wear protective

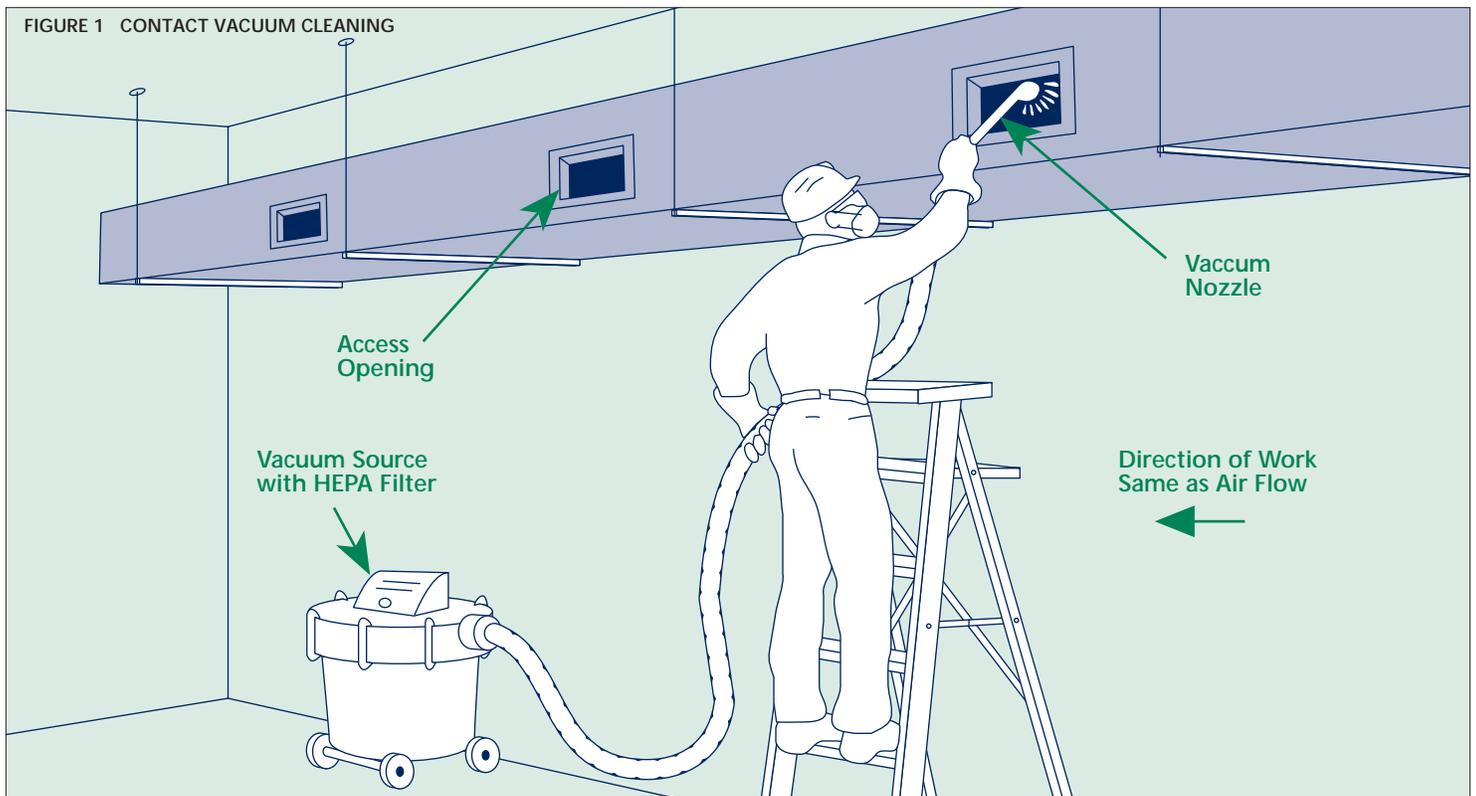
clothing including a mask, safety eye protection, long sleeve shirts and gloves, and (where OSHA requirements dictate) hard hats. Workers should wear appropriate respirators approved for use in areas where microbiological, particulate and volatile organic contaminants may be present.

How to Clean: A Look at the Methods

There are several general methods currently in use for cleaning insulated ducts. Three most commonly used, and frequently effective are: *contact vacuuming*, *air washing* and *power brushing*. In some cases, a combination of these methods may be required to

get the best results.

1 **Contact Vacuuming**
A portable vacuum such as a “shop-vac” is hand-operated. There is direct contact between the brush head and the interior duct surfaces to dislodge and remove dirt and debris. This method requires more and larger openings into the duct than other methods since the vacuum action is limited to the operator’s reach. This method is most likely to allow the escape of dust and dirt from the duct during the cleaning process because the duct is not being subjected to negative pressure. The following two methods both involve



negative pressure.
(See Figure 1.)

2 Air Washing

Compressed air is introduced into the duct through a hose terminated in a 'skipper' nozzle. This nozzle is designed so that the compressed air propels it inside the duct while dislodging dirt and debris. The dislodged dirt and debris becomes airborne, and is drawn downstream through the duct and out of the system by the vacuum collection equipment.
(See Figure 2.)

3 Power Brushing

Pneumatically or electrically powered rotation bristle brushes loosen dirt and debris which is drawn

downstream into the vacuum collector as in the air washing method. Use of this method requires care so as not to damage the insulation surfaces. Only soft bristle brushes should be used.
(See Figure 3.)

Other methods such as steam cleaning are often used to clean coils and other system components. Steam cleaning and other systems involving moisture should not be used on any kind of insulated ductwork, as it is impossible to avoid getting the insulation wet.

What about Sanitizing?

A second aspect of the duct cleaning process may involve the introduction of chemical "sanitizing" agents

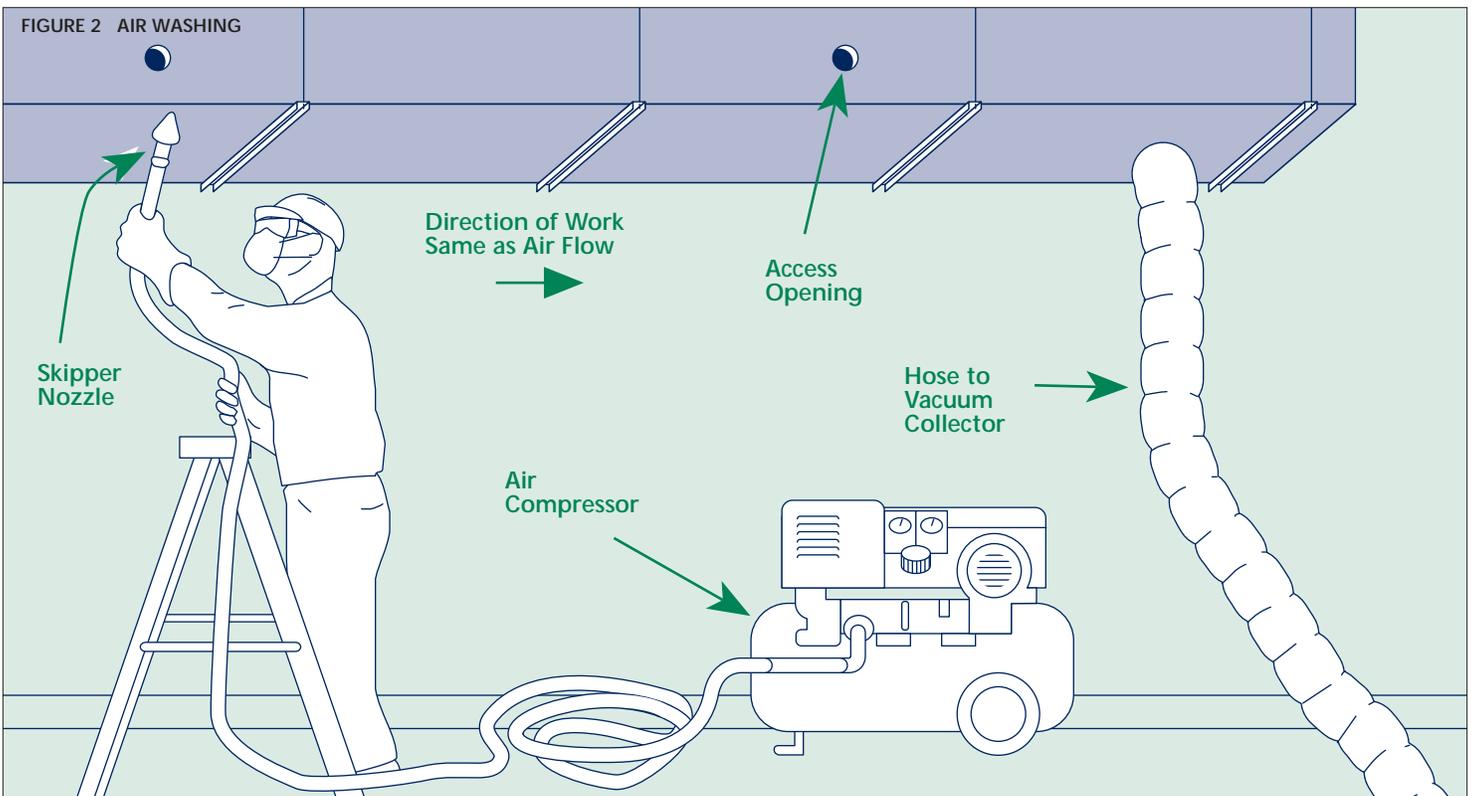
into the duct system in an attempt to kill bacteria, germs, and fungi. This process remains controversial and expert assistance should be sought to determine if this process is necessary, and what (if any) agents should be used. Precautions should be taken to protect building occupants and workers from exposure to the sanitizing agents. Air purifier type chemicals sprayed into duct systems may have a 'fresh' smell, but they provide no real lasting effects and in worst cases may further degrade indoor air quality.

What about Sealing?

Manufacturers of sealants marketed to coat and seal duct surfaces claim that

these sealants prevent the release of dust and dirt particles into the air stream. These materials are often applied by atomizing the sealant into the duct system. Tests evaluating the effectiveness of this process tend to indicate that materials introduced in this manner do not provide a complete coating of the duct surface, and thus may be of little benefit if total coating of the interior surface is the desired result.

The performance of fibrous glass duct interior surfaces has been carefully engineered to provide high acoustical and thermal performance properties unique to the system design. It's important that the use of sealants not impair this performance and



the ability of the insulation to meet all building codes, Underwriters Laboratory (U.L.) and National Fire Protection Association (NFPA) requirements.

Additionally, sealants must be examined for resistance to deterioration so they will not become contributors to airborne material. It is also important that the sealants comply with all combustion toxicity and volatile organic compound off-gassing requirements.

Summary

The most effective way to keep a duct system clean is to use a high efficiency, properly maintained air filtering system. To help prevent indoor air quality problems, it is prudent to

employ preventative measures such as regular HVAC system inspection and maintenance procedures and prompt repair of moisture causing sources. Improper selection and maintenance of filters may lead to dirt and dust collection in the HVAC system and the need for duct cleaning.

If duct cleaning is necessary, care must be taken in the selection and application of any cleaning process. Several viable methods are available which have been proven effective in cleaning insulated duct systems.

It is recommended that independent expert advice be sought before introducing “sanitizing”

anti-microbial agents into the duct work.

Care should be taken to ensure that any chemical coating introduced into the ductwork by the atomization process and carried to the duct surface by the moving air will satisfactorily seal the surface. With any coating, care should be taken not to alter the surface burning characteristics of the duct material.

When duct cleaning is finished, openings must be properly sealed so that the system’s thermal, acoustical, and air-tightness properties are restored. Refer to NAIMA’s *Cleaning Fibrous Glass Insulated Air Duct Systems* (Pub. No. AH-122) for complete

details on cleaning insulated duct systems.

