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Subject: Cleaning Procedures



AC_VENTILATION EXHAUST SYSTEM
SYSTEM Procedur...LEANING PROCED..

Attached are the revised cleaning procedures.

(See attached file: AC_VENTILATION SYSTEM Procedures .doc) (See attached
file: EXHAUST SYSTEM CLEANING PROCEDURES.doc)

WTC Indoor Dust Cleaning Program

AC/Ventilation System Cleaning Procedures

General

1. It is necessary to ensure that sufficient air velocity and/or negative pressure is maintained in the duct during cleaning, to prevent the dispersion of dust outside of the duct. A HEPA filtered vacuum collection device shall be used to depressurize the ductwork to be cleaned. The AFD or vacuum collection equipment shall be adequate to collect all dust and debris released by the cleaning process and shall be attached to the existing ductwork with air-tight connections and located to attain maximum collection efficiency.
2. A temporary containment should be installed around the air handling units during cleaning to provide additional protection against the release of dust. Containment is not required for air handling units located outdoors unless located near active air intakes.
3. When cleaning the AC/ventilation system fan unit or other components, it is important that all components in contact with the air stream are cleaned. This procedure anticipates that once an air handling system has been selected for cleaning, all components, not just those with visible WTC dust, are cleaned.
4. Provisions must be made to prevent the release of dust or debris at access points that are disturbed by the cleaning activities. If the branch ducts are accessible (typically 6' or less in length from access point) it is not necessary to construct a temporary containment at the access point provided that a) they may be cleaned using HEPA vacuums with brush attachments and wet methods and b) negative pressure within the system is sufficient to provide a face velocity at the diffuser or grille opening of 500 feet per minute. For longer branches that require the use of mechanical devices such as whips, brushes, and compressed air, or where it is not possible to establish a face velocity at the diffuser or grille opening of 500 feet per minute, construct a temporary containment (e.g., a "cube" or "cocoon" with flapped entrance) at the access point to provide protection against the release of dust.
5. It is recommended that air filtration devices and vacuum collection equipment be exhausted to the outdoors unless special measures are taken to control the leakage of air contaminants from the exhaust of such equipment (see Procedures item 7).
6. Note that porous interior duct insulation may be located in some of the AC/ventilation fan units or in ducts. Unless the insulation is protected by a metal screen, care must be taken to avoid damaging or tearing the insulation. For duct cleaning, soft rotary brushes, compressed air or HEPA vacuums may be used for cleaning. In AC/ventilation fan units, HEPA vacuums may be used for cleaning. After satisfactory cleaning of porous interior insulation, an appropriate encapsulant shall be applied to the porous surface.

Encapsulant coatings shall be for specific use in ventilation systems and applied per manufacturer's instructions including safety instructions. Encapsulant coatings shall be applied directly to the interior porous surfaces of AC/ventilation system components by hand brushing, rolling, or troweling, or via spray system, with a maximum distance of

24" from the spray discharge tip to the surface being treated. Encapsulant coatings may not be fogged into the system. A continuous film thickness should be achieved in treated areas, as per manufacturer's instructions. Encapsulants shall be water-based, with low VOC (volatile organic compound) emissions, and meet NFPA smoke development and flame spread requirements for ventilation system products. Encapsulant coatings shall be applied in accordance with applicable federal, state, or local regulations regarding the use of such products and MSDS copies for any encapsulant products used in the AC/ventilation system shall be available on-site.

Areas of damaged interior AC/ventilation system fan unit or duct insulation that is abraded or delaminated such that application of an encapsulant coating would be inappropriate as determined by the NADCA-certified ASCS should be removed in consultation with building management. Replacement of such insulation with an appropriate material shall be the responsibility of building management.

Procedures

1. Identify the system to be cleaned including outside air intake, fan unit, supply ducts and return ducts if appropriate.
2. Determine how the system will be segregated for cleaning; typically the fan unit will be cleaned separately from the ductwork unless the ductwork consists of very short runs on the same floor. Cleaning should start from the furthest point in the system and proceed towards the collection device.
3. Lock out and tag out the fan unit. Building management will be responsible for identify and disabling in-duct smoke detectors if present.
4. Attach a local capture, HEPA filtered, Air Filtration Device (AFD) or vacuum collection system to place the system under negative pressure. Sufficient negative pressure shall be maintained to prevent the dispersion of dust outside of the duct. Isolation/zone pillows shall be used as necessary to isolate sections of the system, so that sufficient negative pressure is maintained in each work zone.
5. Exhaust the AFD or vacuum collection system to the outdoors. If no window is available, a stairwell may be appropriate. Alternately, two AFD's or vacuum collection systems may be connected in series so that a second unit filters the exhaust air from the first. Alternately, the cleaning contractor can have the collection equipment leak tested in-place by an independent third party to ensure that contaminants do not leak through the air cleaning device.
6. Cover all open supply air grilles, supply diffusers, and return air grilles located in the affected ductwork using fire-retardant polyethylene sheeting or bags and duct tape or preservation tape.
7. Place the air handling units and their components under containment prior to beginning work. A temporary Zip-wall containment of 6-mil, fire retardant polyethylene sheeting extending from the floor to the ceiling deck, with a flapped entrance, and maintained under negative pressure using a HEPA-filtered air filtration device is sufficient. The footprint of the containment should be large enough to accommodate a ladder or scaffolding if needed.

8. If there is an outside air intake, clean the intake louvers by damp wiping. If there is an outside air duct and it is accessible, clean the interior surfaces using HEPA vacuums with brush attachments and wet methods. If access to the outside air duct is limited, clean it using a combination of whips (whips only used in ducts without interior insulation), brushes (use soft brushes if ducts have interior insulation), and compressed air (note: compressed air may be used only if the system is sufficiently isolated and vacuum collection equipment is used to maintain a duct velocity of approximately 3000 feet per minute). Note that vertical risers may be treated similarly to the procedures identified for exhaust ducts.
9. Clean the air intake louvers and filter racks at the return air sides of the AC/ventilation units by damp wiping.
10. Clean all parts of the A/C or ventilation fan unit exposed to the air stream including thermal coils, the blower assembly and housing, and all other components using HEPA vacuum brush attachments and minimal wet methods. Electric coils and components shall be cleaned using dry methods. When wet cleaning thermal coils, apply manufacturer-approved cleaning solution to the coils using low pressure methods (i.e., airless sprayer, hand operated pump).
11. Clean all supply mains and branch ducts starting at the furthest point from the AFD or vacuum collection device. If the ducts are accessible (typically 6' or less in length from access point) they may be cleaned using HEPA vacuums with brush attachments and wet methods. If access to the ducts is limited (typically 6' or more in length from access point), clean them using a combination of whips (whips only used in ducts without interior insulation), brushes (use soft brushes if ducts have interior insulation), and compressed air (note: compressed air may be used only if the system is sufficiently isolated and vacuum collection equipment is used to maintain a duct velocity of approximately 3000 feet per minute).

Use isolation/zone pillows as necessary to isolate sections of the system, so that sufficient negative pressure is maintained in each work zone and to prevent re-contamination of cleaned sections.

12. Apply encapsulant to any exposed porous insulation in the AC/ventilation system fan unit or ducts.
13. Protect the floor underneath the supply grilles/diffusers or return air grilles using 6 mil polyethylene sheeting. Remove the polyethylene barriers covering the supply air diffusers/grilles and return grilles, while the duct is still under negative pressure.
14. Remove supply air grilles and diffusers to a central location for cleaning. Clean using Simple Green or a similar environmentally safe product. Use bags if necessary when removing the grilles and/or diffusers to prevent dust or debris from being released. Reinstall supply grilles/diffusers and return air grilles after cleaning.
15. Air filters within the AC/ventilation system shall be removed and disposed of. It shall be the responsibility of building management to provide replacement filters.
16. Disengage the local capture system and relocate to another section of the duct to be cleaned.

17. Prior to dismantling work area preparations, clean interior walls of temporary containments using wet-wiping or HEPA vacuum methods.
18. Occupied areas or common areas in which fan unit cleaning is accomplished, will be cleaned as common spaces using the common space unit prices, immediately after the HVAC cleaning is complete.
19. Place waste and debris into 6 mil polyethylene bags for disposal as asbestos-containing waste.
20. Perform all duct cleaning work in accordance with local, state and federal regulations.
21. All work will be accomplished by DEP certified Asbestos Handlers.
22. All work will be supervised by a DEP certified Asbestos Handler Supervisor.
23. All work will be overseen by a NADCA certified ASCS or equivalent.
24. Workers will utilize ½ face APR's equipped with P-100 filters, eye protection and full body coveralls during the cleaning process.
25. In most cases minimal dust accumulations were observed on components and the system has been in operation for over a year, large amounts of debris are not expected during dismantling of the system components. All specified cleaning is being performed after the installation of negative pressure ventilation equipment and system isolation devices. The existing dust/debris conditions and required engineering controls for the cleaning indicate that personal air samples are not expected to exceed 0.1 f/cc. The cleaning contractor shall collect personal air samples on workers and submit the results of sampling within 48 hours. Based on the above, the work area will not be considered as regulated area. In the event large accumulations of dust/debris are observed during the work or personal air samples exceed 0.1 f/cc work practices and engineering controls will be reevaluated and revised accordingly.

WTC Indoor Dust Cleaning Program

Exhaust System Cleaning Procedures

General

1. It is necessary to ensure that sufficient air velocity and/or negative pressure is maintained in the duct during cleaning, to prevent the dispersion of dust outside of the duct and to ensure that debris dislodged by mechanical cleaning devices is transported to a collection device. A HEPA filtered vacuum collection device shall be used to depressurize the ductwork to be cleaned. The AFD or vacuum collection equipment shall be adequate to collect all dust and debris released by the cleaning process and shall be attached to the existing ductwork with air-tight connections and located to attain maximum collection efficiency.
2. Provisions must be made to prevent the release of dust or debris at access points that are disturbed by the cleaning activities. If the branch ducts are accessible (typically 6' or less in length from access point) it is not necessary to construct a temporary containment at the access point provided that a) they may be cleaned using HEPA vacuums with brush attachments and wet methods and b) negative pressure within the system is sufficient to provide a face velocity at the grille opening of 500 feet per minute. For larger branches (typically 6' or greater in length from access point) that require the use of mechanical devices such as whips, brushes, and compressed air, or where it is not possible to establish a face velocity at the grille opening of 500 feet per minute, construct a temporary containment (e.g., a "cube" or "cocoon" with flapped entrance) at the access point to provide protection against the release of dust. Containment is not required for air handling units located outdoors unless located near active air intakes.
3. It is recommended that air filtration devices and vacuum collection equipment be exhausted to the outdoors unless special measures are taken to control the leakage of air contaminants from the exhaust of such equipment (see Procedures item 7).

Procedures

1. Identify the system to be cleaned including exhaust fan (e.g., "mushroom" fans), number and location of risers, and apartments or common spaces affected.
2. Determine how many floors on a riser will be cleaned as part of one continuous cleaning (5 – 10 floors).
3. Lock out and tag out the exhaust fan.
4. Attach a local capture, HEPA filtered, vacuum collection system to the riser to place the system under negative pressure. Polyethylene sheeting should be used to protect the floor underneath the vacuum collection equipment if located indoors.
5. Exhaust the vacuum collection system or AFD to the outdoors. If no window is available, a stairwell may be appropriate. Alternately, two vacuum collection systems or AFD's may be connected in series so that a second unit filters the exhaust air from the first. Alternately, the cleaning contractor can have the collection equipment leak tested in-place by an independent third party to ensure that contaminants do not leak through the air cleaning device.

6. Install one layer of 6 mil poly over all bathroom and kitchen exhaust grilles and secure in place with painters tape.
7. Insert and inflate isolation/zone pillows, as necessary to isolate system, so that floors beyond the cleaning scope area outside the work zone, and to maintain sufficient negative pressure in the section of the ventilation system being cleaned.
8. Remove the mushroom or other fan type housing or weather cap assembly from the roof mounting. Disregard this step if the mushroom was removed previously to install the vacuum collection system on the roof.
9. Disassemble and clean the mushroom, other fan type housing or weather cap assembly using HEPA vacuums with brush attachments and wet methods, as necessary to remove dust (any electrical equipment will not be cleaned with wet methods).
10. Clean the main riser using a combination of techniques including whips, brushes, and compressed air (note: compressed air may be used only if the system is sufficiently isolated and vacuum collection equipment is used to maintain a duct velocity of approximately 3000 feet per minute to capture and transport dislodged material). Cleaning of the riser should start at the furthest point from the AFD or collection device. Clean the riser prior to cleaning the associated branch ducts.
11. Reinstall the mushroom, other fan type housing or weather cap assembly once the riser or top zone is cleaned.
12. For accessible branch ducts (typically 6' or less in length from access point): One by one, place an approximately 6' x 6' drop cloth of 6 mil polyethylene sheeting on the surfaces below each bathroom and kitchen exhaust grille. Check to ensure that the face velocity at the grille opening is 500 feet per minute or greater. Remove and clean each bathroom and kitchen exhaust grille inside the affected apartment. Clean all branch ducts from inside the apartment bathrooms and kitchens, using HEPA vacuums with brush attachments and wet methods. After cleaning, reinstall the bathroom or kitchen exhaust grille and cover again with polyethylene sheeting secured with painter's tape to help maintain negative pressure within the exhaust ventilation system before moving on to the next grille. Roll up the polyethylene sheeting protecting the surfaces below the exhaust vent and place in a 6 mil polyethylene bag for disposal as asbestos-containing waste.
13. For inaccessible branch ducts (typically 6' or greater in length from access point): prior to inserting mechanical cleaning devices into the access point, construct a temporary containment (see General item 2) to contain the access point. Remove and clean the grille. Clean the branch duct using a combination of whips, brushes, and compressed air (note: compressed air may be used only if the system is sufficiently isolated and vacuum collection equipment is used to maintain a duct velocity of approximately 3000 feet per minute).

Use isolation/zone pillows as necessary to isolate sections of the system, so that sufficient negative pressure is maintained in each work zone and to prevent re-contamination of cleaned sections.

After cleaning, reinstall the bathroom or kitchen exhaust grille and cover again with polyethylene sheeting secured with painter's tape to help maintain negative pressure

within the exhaust ventilation system before moving on to the next grille. HEPA vacuum or wet-wipe interior surfaces of the temporary containment prior to dismantling or moving to another location. Place all waste in 6 mil polyethylene bags for disposal as asbestos-containing waste.

14. Clean the bottom of the riser using a HEPA vacuum to collect any debris that has fallen to the bottom.
15. Disengage the local capture system and relocate to another section of the riser or to another riser.
15. Ensure that the occupant space is free of any debris associated with the duct cleaning process. Use HEPA vacuums and/or wet wiping to clean the space, as needed. Place waste and debris into 6 mil polyethylene bags for disposal as asbestos-containing waste.
16. Perform all duct cleaning work in accordance with local, state and federal regulations.
17. All work will be accomplished by a DEP certified Asbestos Handlers.
18. All work will be supervised by a DEP certified Asbestos Handler Supervisor.
19. Workers will utilize ½face APR's equipped with P-100 filters, eye protection and full body coveralls during the cleaning process.
20. In most cases minimal dust accumulations were observed on components and the system has been in operation for over a year, large amounts of debris are not expected during dismantling of the system components. All specified cleaning is being performed after the installation of negative pressure ventilation equipment and system isolation devices. The existing dust/debris conditions and required engineering controls for the cleaning indicate that personal air samples are not expected to exceed 0.1 f/cc. The cleaning contractor shall collect personal air samples on workers and submit the results of sampling within 48 hours. Based on the above, the work area will not be considered as regulated area. In the event large accumulations of dust/debris are observed during the work or personal air samples exceed 0.1 f/cc work practices and engineering controls will be reevaluated and revised accordingly.