

November 2, 2006

**DUCT CLEANING CONTRACT**  
**BETWEEN POWER VAC G.T.A. LTD. & THE SCARBOROUGH HOSPITAL**

**Part 1 – Special Provisions**

1.01 Qualification of the HVAC System Cleaning Contractor (**Power Vac G.T.A. Ltd.**)

- (A) Membership: The HVAC system cleaning contractor (Power Vac®) shall be a certified member of The National Air Duct Cleaners Association (NADCA) and be a member in good standing of The Toronto Construction Association.
- (B) Certification: The HVAC system cleaning contractor (Power Vac®) shall have a minimum of five (5) Air System Cleaning Specialists (ASCS) certified by NADCA on a full time basis and one full time Mechanical Engineer to oversee the project and sign off reports.
- (C) Full time on site Supervisor Qualifications: A person certified as an ASCS by NADCA, shall be responsible for the total work herein specified.
- (D) Experience: The HVAC system cleaning contractor (Power Vac®) shall submit records of experience in the field of HVAC system cleaning as requested by **The Scarborough Hospital**. Bids shall only be considered from firms, which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.
- (E) Equipment, Material and Labor: The HVAC system cleaning contractor (Power Vac®) possess and furnish all necessary equipment, materials and labor to adequately perform the specified services. Sub-contracting is not permitted.
  - 1. Power Vac® shall assure that its employees have received safety equipment training, ladders and scaffolds training, WHMIS training, confined space training and power elevated work platform training, material handling/back care site safety, safety legislation, personal protective equipment, and manufacturers product and material safety date sheets (MSDS) as required for the work by the CSAO, and as described by this specification (Construction Safety Association of Ontario).
  - 2. Power Vac® shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable CSAO programs and this specification.
  - 3. Power Vac® shall submit to **The Scarborough Hospital** all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

- (F) Licensing: The HVAC system cleaning contractor (Power Vac®) shall provide proof of maintaining the proper insurance of \$5,000,000 Commercial General Liability. Contractor shall comply with all Federal and local rules, regulations, and licensing requirements and provide Provincial WSIB Clearance certificate for this contract before start-up.

#### 1.02 Standards

- (A) NADCA Standards: The HVAC system cleaning contractor (Power Vac®) shall perform the services specified here in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA).
4. All terms in this specification shall have their meaning defined as stated in the NADCA Standards.
  5. NADCA Standards must be followed with no modifications or deviations being allowed.

#### 1.03 Documents

- (A) Mechanical Drawings: **The Scarborough Hospital** shall provide the HVAC system cleaning Contractor (Power Vac®) with one copy of the following documents:
1. Project drawings and specifications.
  2. Approved construction revisions pertaining to the HVAC system.
  3. Any existing indoor air quality (IAQ) assessments or environmental reports prepared for the facility.

### **Part 2 – HVAC System Cleaning Specifications and Requirements**

#### 2.01 Scope of Work

- (A) Scope: This section defines the *minimum* requirements necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

Power Vac® shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.

The HVAC system includes any interior surface of the facility's air distribution system for conditioned spaces and/or occupied zones. This includes the entire heating, air conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system. The return air grilles, return air ducts to the air handling unit (AHU), the interior surfaces of the AHU, mixing box, coil compartment, condensate drain pans, humidifiers and dehumidifiers, supply air ducts, fans, fan housing, fan blades, air wash systems, spray eliminators, turning vanes, filters, filter housings, reheat coils, and supply diffusers are all considered part of the HVAC system. The HVAC system may also include other components such as dedicated exhaust and ventilation components and make-up air systems, excluding dust collection systems.

## 2.02 HVAC System Component Inspections and Site Preparations

- (A) HVAC System Component Inspections: Prior to the commencement of any cleaning work, the HVAC system-cleaning contractor (Power Vac®) shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project. The cleanliness inspection should include air handling units and representative areas of the HVAC system components and ductwork. In HVAC systems that include multiple air handling units, a representative sample of the units should be inspected.

The cleanliness inspection shall be conducted without negatively impacting the indoor environment through excessive disruption of settled dust, microbial amplification or other debris. In cases where contamination is suspected, and/or in sensitive environments where even small amounts of contaminant may be of concern, environmental engineering control measures should be implemented.

1. Damaged system components found during the inspection shall be documented and brought to the attention of **The Scarborough Hospital**.

- (B) Site Evaluation and Preparations: Power Vac® shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.
- (C) Inspector Qualifications: Qualified personnel should perform the HVAC cleanliness inspection to determine the need for cleaning. At minimum, such personnel should have an understanding of HVAC system design, and experience in utilizing accepted indoor environmental sampling practices, current industry HVAC cleaning procedures, and applicable industry standards.

### 2.03 General HVAC System Cleaning Requirements

- (A) Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.
- (B) Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building. Use Comport 8000 VFD Power Unit, bag house, and portable electric compressor, (using 220v-50amp service for maximum suction) 110 v units are not acceptable.
- (C) Controlling Odors: Measures shall be employed to control odors and/or mist vapors during the cleaning process.
- (D) Component Cleaning: Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.
- (E) Air-Volume Control Devices: Dampers any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.
- (F) Service Openings: Power Vac® shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.
  - 1. Power Vac® shall utilize the existing service openings already installed in the HVAC system where possible.
  - 2. Other openings shall be created where needed and they must be created so they can be sealed in accordance with industry codes and standards.
  - 3. Closures must not significantly hinder, restrict, or alter the airflow within the system.
  - 4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system (min 18GA galvanized) c/w Neoprene Gaskets.

5. Openings must not compromise the structural integrity of the system.
6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.
7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
8. Rigid fiberglass duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques that comply with UL Standard 181 or UL Standard 181a are suitable for fiberglass duct system closures.
9. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to **The Scarborough Hospital** in project report documents.

(G) Ceiling sections (tile): Power Vac® may remove and reinstall ceiling sections to gain access the HVAC systems during the cleaning process.

(H) Air distribution devices (registers, grilles & diffusers): Power Vac® shall remove and clean all air distribution devices.

(I) Air handling units, terminal units (VAV, Dual duct boxes, etc.), blowers and exhaust fans: Power Vac® shall insure that supply, return and exhaust fans and blowers are thoroughly cleaned. Areas to be cleaned include blowers, fan housings, plenums (except ceiling supply and return plenums), scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies. All visible surface contamination deposits shall be removed in accordance with NADCA Standards. Power Vac® shall:

1. Clean all air handling units (AHU) internal surfaces, components and condensate collectors and drains.
2. Assure that a suitable operative drainage system is in place prior to beginning wash down procedures.
3. Clean all coils and related components, including evaporator fins.

(J) Duct Systems: Power Vac® shall:

1. Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.
2. Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Tests (see NADCA Standards). Use scorpion cleaning system with predator whip in combination with full contact brushes at all times during cleaning process.

#### 2.04 Health and Safety

- (A) Safety Standards: Power Vac® shall comply with applicable federal, provincial, and local requirements for protecting the safety of Power Vac® employees, building occupants, and the environment. In particular, all applicable standards of the CSAO shall be followed when working in accordance with this specification.
- (B) Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
- (C) Disposal of Debris: All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, provincial and local requirements.

#### 2.05 Mechanical Cleaning Methodology

- (A) Source Removal Cleaning Methods: The HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is Power Vac® responsibility to select Source Removal methods that will render the HVAC system Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.
1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during the cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of 220v-50-amp power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured. Magnetic gages must be used to achieve 0.20”w.g.

2. All vacuum devices exhausting air inside the building shall be equipped HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.
4. All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those, which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

#### (B) Methods of Cleaning Fibrous Glass Insulated Components

1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.
2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).

#### (C) Damaged Fibrous Glass Material

1. Evidence of damage: If there is any evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.
2. Replacement: When requested or specified, Power Vac® must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.
3. Replacement material: In the event fiberglass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA.
4. Replacement of damaged insulation is **not** covered by this specification.

#### (D) Cleaning of Coils

1. Any cleaning method may be used which will render the Coil visibly Clean and capable of passing Coil Cleaning Verification (see applicable NADCA Standards). Coil drain pans shall be subject to Non-Porous Surfaces Cleaning Verification. The drain for the condensate drain pan shall be operational. Cleaning methods shall not cause any appreciable damage to, displacement of, inhibit heat transfer, or erosion of the coil surface or fins, and shall conform to coil manufacturer recommendations when available. Coils shall be thoroughly rinsed with clean water to remove any latent residues, and steam cleaned using Signum 1500 Vapor Cleaning System to remove plaque off fins (148 degrees C. at 66 PSI).

#### (E) Biocidal Agents and Coatings

1. Biocidal agents shall only be applied if active fungal growth is reasonable suspected, or where unacceptable levels of fungal contamination have been verified through testing.
2. Application of any biocidal agents used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.
3. When used, chemical biocides and coatings shall be applied in strict accordance with manufacturer recommendations and EA registration listing.
4. Biocidal coatings shall be applied according to manufacturer's instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than "fogged" downstream into surfaces. A continuous film must be achieved on the surface to be treated by the coating application. Application of any millage surface application rate standards for effectiveness.

### 2.06 Cleanliness Verification

- (A) General: Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any treatment or introduction of any treatment-related substance to the HVAC system, including biocidal agents and coatings.
- (B) Visual Inspection: The HVAC system shall be inspected visually to ensure that no visible contaminants are present.
  1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, **The Scarborough Hospital** reserves the right to further verify system cleanliness through Surface Comparison Testing or the NADCA vacuum test specified in the NADCA standards.



2. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.
3. NADCA vacuum test analysis must be performed by a qualified third party experienced in testing of this nature. Carry costs of (50) NADCA tests.
4. Cleanliness verification shall be performed immediately after mechanical cleaning and before the HVAC system is restored to normal operation.

(C) Verification of Coil Cleaning

1. Cleaning must restore the coil pressure drop to within 10 percent of the pressure drop measured when the coil was first installed. If the original pressure drop is not known, the coil will be considered clean only if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection (see NADCA Standards). Coil pressure drop to be measured using “magnehelic gauge” before and after cleaning with airflow operational.

2.07 Pre-existing System Damage

- (A) Power Vac® is not responsible for problems resulting from prior inappropriate or careless cleaning techniques of others.

2.08 Post-project Report

- (A) At the conclusion of the project, Power Vac® shall provide a report to **The Scarborough Hospital** indicating the following:

1. Success of the cleaning project, as verified through visual inspection.
2. Areas of the system found to be damaged and/or in need of repair.

**Acceptance of the above contract: (Refer to Appendix A)**

**Authorized Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Title:** \_\_\_\_\_ **Purchase Order #:** \_\_\_\_\_