Terms of Reference
Air Handling Unit (HVAC System) Cleaning

Introduction

General cleaning of the air handling units is currently undertaken by the Mechanical Division staff composing of 3 personnel. Cleaning is done for every air handling unit once a month; there are a total of 33 air handling units. On occasions wherein passenger traffic is at peak, cleaning is undertaken during night time.

Cleaning methods are carried out in the simplest manner due to the absence of the essential tools/equipments, proper training and the required personnel complement.

Objective

Cleaning encompasses the removal of contaminants in order to restore HVAC systems to a specific cleanliness level as described therein. Mactan-Cebu International Airport Authority is committed to providing an indoor environment/air quality free of contaminants and airborne disease agents.

Description of Services

1. This description outlines the procedure the Contractor shall employ in the cleaning and maintenance of 32 Air Handling Units and all associated air side supply air and return air ductwork. The cleaning procedures shall cover the following equipment:

   a) All components of the airside surfaces of Air Handling Units.
   b) Airside surfaces of supply air duct work; return air duct work, outside air ductwork.
   c) Airside surface of all Variable Air Volume devices and Mixing Boxes.
   d) All supply air diffusers and return air grilles within the AHU room.
   e) AHU enclosure internal surfaces including condensate pan
   f) AHU evaporative/cooling coil
   g) AHU filter
   h) AHU Room, floors and walls
   i) AHU Fan & Motor assembly
   j) Control Panel
   k) Replacement of existing filters with new (MCIAA supplied unless otherwise noted)
   l) Sound attenuators
   m) Fire and fire/smoke dampers
2. These procedures will consist of power washing the coils, blowers and drain pans, vacuuming the interior of the air handling unit, connecting ductwork, volume control mechanisms and supply and return air grills. After the source removal cleaning procedures are complete, the entire system will be sanitized with a DA/DOH/OSHA registered biocide to treat for the presence of mold, mildew and bacteria.

3. The following is a detailed explanation of TYPICAL specifications for mechanical hygiene services. It is important to note that these procedures incorporate the practices promoted by ASHRAE. They include the thorough accessing and cleaning of all interior surfaces of the air delivery system.

4. The frequency of general cleaning of each of the air handling units and mechanical room is at least once a month or as needed.

**Air Handler Refurbishment**

Prior to work commencement, a pre-arranged schedule of shut down times for each air handling unit shall be established with the Mechanical Division. The Mechanical Division or its authorized representative will be notified prior to any activity with the air handling units. The MD Engineer will be responsible for the shut down and start up of all air handling equipment.

The intent of the AHU refurbishment is to control the deterioration of the internal components by restoring surfaces to original or better condition. Work on each unit includes, but is not limited to the following:

### A. Mixing Chamber

1. Vacuum the interior surfaces of the mixing chamber, removing all gross debris.

2. Set up steam cleaner in area that is safe for discharge. Utilize high pressure, hot water cleaning system to remove the debris that is secured to the chamber walls. (grease, cigarette smoke, stains, etc)

3. Repair insulation to original condition. If insulation covering is deteriorated then seal the covering with an approved sealant.

4. Sanitize the entire plenum, drains, and dampers with an approved disinfectant and fungicide after equipment areas are cleaned and sealed. Disinfectant, fungicide/chemicals used in this project shall have a Material Data Sheet (MSDS) submitted to the client for approval before usage.
B. **Filter Section**

1. Remove filters from the rack and prepare the area for cleaning. If filters are to be reused, clean and store in a clean dry area.

2. Scrap debris from the filter rack area. Vacuum clean and/or high-pressure hot water wash the filter rack system. (Ensure proper drainage is available before cleaning)

C. **Coil Section**

1. Take precautions not to damage coil fins. If fins are bent prior to cleaning then straighten (as best as possible) fins utilizing a coil combing system after cleaning process or if severe then prior to.

2. High-pressure hot water clean the coil system. First apply hot water to one side of the coil section. Repeat process on other side of coil section. Rinse each side. Continue process until clear water can penetrate coil section on entire coil face.

   If application of biodegradable cleaning solution is used, allow time for cleaning solution to penetrate in coil section (This procedure shall be implanted only when necessary and with the approval of the Mechanical Division engineer or his authorized representative).

3. After cleaning, sanitize coil section with an acceptable biocide. Biocide/chemicals. Used in this project shall have a Material Data Sheet (MSDS) submitted to the client for approval before product approval.

D. **Fan Section**

1. Vacuum clean the fan housing and motors to remove debris and excess grease.

2. Hand scrap fan impellers and remove loose debris from the internal surfaces of the fan housing. Take precautions not to damage impellers, alter blade shape or weight, or affect impeller balance.

3. Ensure proper drainage/recovery and high-pressure hot water clean the fan section. Cover fan shaft, motor and bearings prior to cleaning.
E. **Plenum Areas**

1. Where internal insulation is damaged or fragile, the contractor shall repair the damaged insulation. If the insulation is damaged beyond repair, replace insulation with same or equal. If the insulation facing is damaged or non-existent, the facing shall be resurfaced with an approved sealant.

2. Vacuum the internal surfaces of the plenums associated with the air handler. Remove gross debris and other debris or excess equipment that may be present. Seal the plenum wall if leaks or holes are noted.

F. **Controlling Odors**

   All responsible measures shall be taken to control any and all offensive odors and/or mist vapors generated during the cleaning process.

G. **Debris Collection**

   Precautions must be taken to ensure that debris is not dispersed outside the air conveyance system during the cleaning process.

H. **Volume, Fire and Zone Dampers**

   Duct mounted volume, fire, and zone damper sets are to be marked to their current setting, then inspected and cleaned if necessary. External moving parts are to be treated with an approved dry lubricant material. After cleaning, the dampers shall be repaired as necessary to insure proper operation and returned to original settings. Contractor shall indicate locations of damaged and/or repaired dampers.

I. **Grills and Diffusers and Glass Panes**

   Whenever the grilles, diffusers and glass panes are removable, they shall be removed, washed, dried, sanitized, and replaced. When they are restricted by a facade or welded in place, hand vacuuming and cleaning are acceptable. The Contractor shall avoid disturbing the existing volume damper settings.
J. Mechanical Room

All loose debris shall be removed and the entire ceiling, floors or mechanical room including but not limited to duct exterior, wall, deck, top of ceiling, structural steel, piping, conduit, light fixtures shall be mechanically vacuumed. The Mechanical Room shall be visibly clean.

Final Inspection and Report

A final check is to be carried out to ensure that no dust or debris remain on surfaces as the result of dismantling operations.

The MD Engineer will thoroughly inspect the space jointly with the Contractor, to determine whether any damage has been done on the finishes, equipment or any other part of the work space. A final inspection report (3 copies) will be prepared and submitted jointly between the MD Engineer and the Contractor to the Mechanical Division. The report shall contain the following:

A. Success of the cleaning project, as verified through visual inspection.

B. The report shall contain photographic or video documentation of representative areas of the ductwork systems cleaned as part of the project. This photo documentation report may contain both before and after pictures verifying the systems are clean, but at a minimum must contain after pictures that show the system is free from non-adhered substances and debris.

C. Areas of the system found to be damaged, in need of repair, and / or requiring more aggressive cleaning.

D. Verification of HVAC performance/ Indoor Air Quality (IAQ) COMPLIANCE.

Mechanical Investigation & Documentation

An inspection is performed inside the facilities air delivery system(mechanical room) that are included in this project’s scope. The investigation will be conducted before and after cleaning at discrete points using digital or 35mm camera or a remote video inspection system with a dedicated VCR. Findings are documented on either still photographs or videotape.
Manpower, Equipment & Materials Requirements

A. Manpower

1. One (1) Foreman - Trade school graduate in refrigeration and air-conditioning
   3-5 years experience, specialize in HVAC equipment.

2. Two (2) Technicians - Trade school graduate in refrigeration and air-conditioning
   2-3 years experience, certified technician

2. Four (4) Helpers - Trade school graduate in refrigeration and
   air-conditioning, 1-2 years experience

B. Equipment & Tools

1. Hot & Cold pressure washer 1,500 psi max / 40°C or more
2. Wet & Dry HEPA vacuum cleaner
3. Air compressor 300cfm
4. Sanitizer & Biocides (Government Approved) with material data sheet.
5. Personal Protective Equipment
6. Step ladder
7. Fins comb
8. Housekeeping tools, mops, brooms, etc.
9. Plastic containers
10. Mechanic tools
11. All other materials & tools necessary to accomplish task

Contractor shall supply all materials for cleaning, repairing and inspection work including HEPA filtered collection systems, rotary brushes, filters, air lances, mechanical agitators, vacuums or other equipment and materials necessary to perform work specified. Furnish materials and equipment that are from a reputable manufacturer. Chemicals utilized in this project shall have a Material Safety Data Sheet (MSDS) submitted to the client before product usage.

SAFETY

The contractor is responsible for providing qualified, trained personnel to undertake cleaning of AHU rooms and its components. Consult all local building, occupational safety, electrical, gas and other codes applicable to the work/task. Safety considerations includes, but are not limited to:

a. The accessibility of the equipment to non service personnel.
b. The provision of electrical lockout switches.
c. Cleaning and maintenance procedures.
d. Use of proper Personnel Protective Equipments (respiratory, gloves and eye, etc.)
e. Lockout of all power supplies prior to beginning of work in accordance with electrical safety guidelines.
f. A fan, even though locked out electrically, can rotate in a seemingly insignificant airflow. The impeller should be secured during maintenance to restrict rotation, making sure that the restrictive device is removed before putting the fan back into service.
g. Always replace any protective covers removed for servicing.
h. Always lock or replace bolt on access door that provide access to moving parts.

**Certification and Experience**

Only Contractors that are regularly engaged in HVAC system maintenance with emphasis on HVAC system cleaning and decontamination shall be considered. The HVAC System Cleaning Contractor shall have the following qualifications:

A. Shall have least 3 years experience in service and maintenance of HVAC, refrigeration and air-conditioning

B. Shall have at least 3 (three) years of experience in air systems and ductwork remediation

C. Shall have a minimum of one (1) Registered Mechanical Engineer employed on a full time basis.

D. Contractor must be registered/accredited with appropriate government agencies (DTI, etc.).

E. Shall produce a reference list to MCIAA of projects/service contracts successfully completed of a similar size and scope.

**Insurance Coverage**

Contractor must maintain the following insurance coverages:

A. Commercial General Liability  
B. Contractors Pollution Liability  
C. Environmental Liability

Minimum Limits required for all coverage:
**Submittal Requirements to MCIAA**

Contractor must submit the following documentation prior to acceptance and award of job:

A. Current insurance certificates for
   1. Commercial General Liability insurance
   2. Contractors Pollution Liability insurance
   3. Environmental Liability insurance

B. Description of cleaning methods, systems, and procedures

C. MSDS sheets on all sanitizers, coatings, solvents, cleaners and disinfectants to be used on the Project.

D. Air Testing Qualifications and Experience, and description of air quality monitoring instrumentation and current calibration certificates.