

## INSTALLATION / OPERATION / MAINTENANCE GUIDE

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## IOM.1 AHU STORAGE INSTRUCTIONS

### MOTORS

#### INTO STORAGE

- Record motor winding impedance, tag motor and send a copy of record to Air Enterprises
- Wrap motor in plastic with desiccant enclosed to insure dryness

#### REMOVAL FROM STORAGE / PREPARATION FOR USE

- Remove and discard plastic wrapping and desiccant enclosed; insure dryness
- Record motor winding impedance, tag motor and send a copy of record to Air Enterprises

### FANS

#### INTO STORAGE

- All fan housings exposed to construction, dirty or wet environments should be wrapped in plastic.
- Loosen belt tension on all belt drive equipment

#### REMOVAL FROM STORAGE / PREPARATION FOR USE

- Remove and discard plastic and desiccant from fan housings and bearings
- Remove shipping blocks
- Inspect fan structure for cracks or breaks.
- Inspect and tighten all mounting bolts for fans, adjustable bases and motors.
- (if applicable) Inspect vortex vanes for wear and ease of operation; lubricate as necessary.
- Inspect condition of sheaves and belts. Tighten belts to proper tension.
- Inspect motor bases for freedom of operation – lubrication, etc.
- Inspect fan base isolation springs for adjustment.
- Inspect evase for cracks or breaks.
- Check canvas connection for holes or tears.
- Takes vibration readings to determine any out of balance condition. Report readings to Air Enterprises for run approval.

## **BEARINGS**

### INTO STORAGE

- If unit was running before storage, shock pulse and vibration readings should be taken on the bearings and recorded. Send copy of recorded readings to Air Enterprises.
- Ball and roller (anti-friction regreasable type). The bearings are to be fully greased at the time of storage. The fan shaft should be rotated manually every month approximately ten revolutions and additional grease added as necessary to keep the bearing cavity full.
- Ball (anti-friction non-regreasable). No additional precautions are necessary.
- Split Pillow Block Bearing should be hand packed full of grease. Insure that no moisture or dirt particles are entrapped during this procedure. The bearing should then be tagged that it contains too much lubricant for normal operation. Fan shafts are to be rotated manually every month approximately ten revolutions and additional grease added as necessary to keep the bearing cavity full.
- Sleeve (oil lube). The bearings are shipped using oil containing a rust inhibitor. The fan shaft should be rotated by hand every month at least 10 to 15 revolutions to assure that an oil film is on the shaft and bearing surfaces.
- All bearings should be wrapped in plastic with a desiccant bag enclosed to insure dryness.

### REMOVAL FROM STORAGE / PREPARATION FOR USE

- Ball and roller (anti-friction, regreasable type) – Purge old grease out with new before operating. Excess grease will purge during the first eight (8) hours of operation.
- Ball (anti-friction non-regreasable) - No additional precautions are necessary.
- Split Pillow Block – Bearing cap to be removed and all lubricant swabbed out with a clean instrument and clean rags. After inspection of the bearings, fresh lubricant should be applied in the specified quantity. Hand pack grease into roller cavity of bearings. Complete greasing is assured if the grease appears on the opposite side. Pack the housing reservoir with grease to a height approximately even with the bottom of the shaft.
- Sleeve (oil lube) – Remove old oil and relubricate with amount and type recommended by manufacturer.
- Take shock pulse readings on all bearings to determine bearing condition. Report readings to Air Enterprises for run approval.

## **COILS**

### INTO STORAGE

- All coils are pressure tested at Air Enterprises factory, test results are logged and coils are yellow tagged.
- If coils going into storage have been in use prior to storage, make sure coils are completely drained.

### REMOVAL FROM STORAGE / PREPARATION FOR USE

- Verify coils are still under pressure.
- Physically inspect coils before energizing.
- Verify vents and drains are closed.

## **VFDs**

### INTO STORAGE

- VFDs exposed to construction, dirty or wet environments should be wrapped in plastic with desiccant enclosed

### REMOVAL FROM STORAGE / PREPARATION FOR USE

- Remove plastic wrapping.
- Check contacts for corrosion.
- Inspection by factory-authorized start-up or service technician is recommended.

## **WARRANTY**

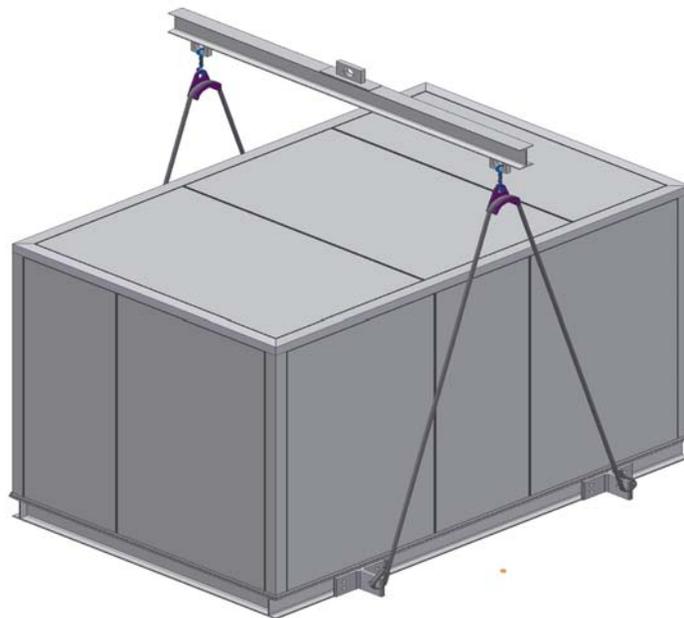
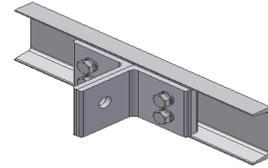
- Warranties are void if equipment failures are caused due to owners neglect and failure to follow these recommended storage procedures or any supplied equipment manufacturers applicable procedures that exceed those outlined here.

**IOM.2 AHU RIGGING / JOINING / INSTALLATION INSTRUCTIONS****IOM2.1 REQUIRED TOOL LIST TO JOIN CUSTOM AIR HANDLING UNITS**

- Pinch bar for rigging
- Two 1-1/2 ton chain come-along, may need chain extensions
- Air compressor (if using pneumatic tools)
- Electric cords
- Light for working inside air handling unit
- Surveyor's level
- Caulk gun
- Tape measure
- Heavy duty putty knife
- Electric or pneumatic blind rivet tool, heavy duty capacity for pulling 3/16 stainless steel rivets
- Reciprocating saw
- Saw blades 6" metal cutting type
- Electric or pneumatic impact wrenches
- Sockets for impact wrench. Sizes: 3/8, 7/16, 1/2, 9/16, 3/4, 1-1/8
- Electric drills 1/4 or 3/8 chuck
- Electric drill 1/2 (right angle head recommended at 900 RPM or less)
- Drill bits per unit:
  - 20 #11 for rivets
  - 10 7/32 for 1/4 self-tapping bolts
  - 10 9/32 for 5/16 self-tapping bolts
  - 6 1/4 for 1/4 bolts
  - 6 1/2 for 1/2 bolts
  - 1 3/4 for foam holes

## **IOM 2.2 UNIT RIGGING**

- Removable lifting lugs (4) are provided with each AHU section.
- Section may not have equal weight distribution to all lifting points.
- Care must be taken to adjust lifting sling or chains to avoid out of balance loads.
- Spreader bars must be equal to or longer than the center distance between lifting points to avoid damage to side and edge of rig-able section
- All section doors both interior and exterior must be closed and latched prior to rigging to prevent racking of doorjamb.

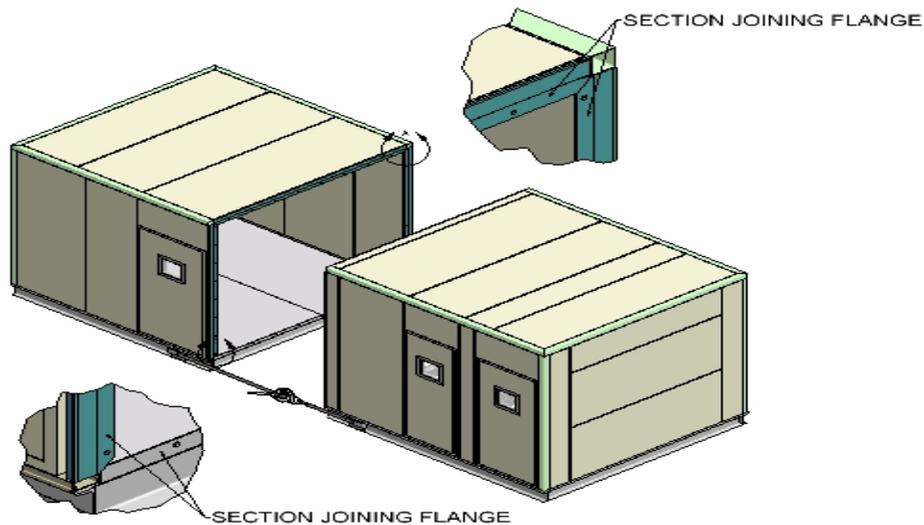


## **IOM 2.3 SETTING UNIT IN PLACE**

- Unit sections must be set on level flat surfaces with no more than  $\pm 1/4$ " variance over the length and width of the entire resting surface. If rigging onto steel supports each unit sections must be supported at perimeter.
- Remove and discard galvanized shipping support bracing, fan tie-down brackets and plastic shipping cover (if provided)

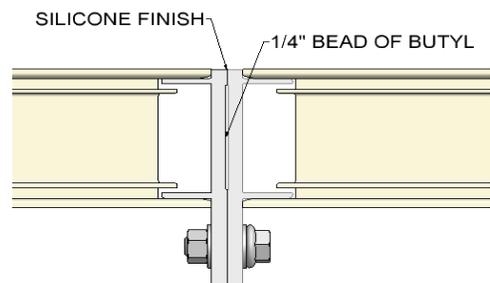
## IOM 2.3 SETTING UNIT IN PLACE, cont.

- It is recommended for ease of joining to rig and set the heaviest section in to place first then adjust, pull and set lighter weight sections.
- Use Pulling plates provided on perimeter channels to aid in pulling sections together.
- Shimming between unit and support structure may be required to level unit and to square doorjamb. Shim and grout perimeter between unit base and support structure every 6 ft and at all door jamps as needed



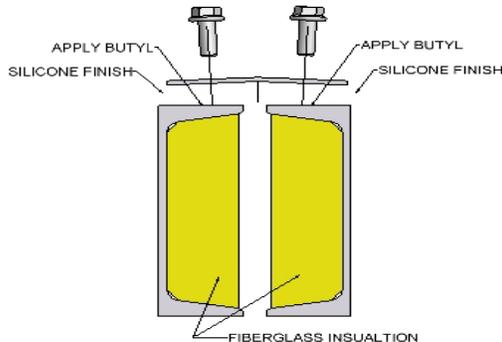
## IOM 2.4 JOINING UNIT SECTIONS

- Factory provided fiberglass insulation must be field installed in the perimeter channel cavity along the unit split line prior to pulling unit sections together.
- Apply 1/4" bead of butyl centered along the face of the joining surface,
- Pull sections together.
- When section joint is flush and square, use 3/8-16 x 1-1/4" hex head stainless bolt, flat washer and nylon-insert locknut to fasten joint. [fasteners provided]
- Apply silicone finish to exterior joint.



## IOM 2.4 JOINING UNIT SECTIONS, cont.

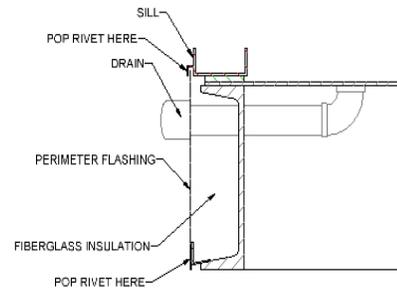
- Internal cap plates are used to finish floor joint sections. Dry fit plate to insure accurate fit.



- Prep caps with 3/8" thread clearance holes along perimeter on 12" centers. Dry fit cap and drill 9/32" holes through clearance holes into channel flange.
- After prepping cap plate and channel flange with holes; apply butyl on both sides of floor split section to create airtight seal under cap plate.
- Secure cap to the floor with 5/16 hex head self tapping bolts on 12" centers.
- Apply silicone caulk around perimeter of cap plate to finish seal.

## IOM 2.5 INSTALLING PERIMETER FLASHING.

- Cut insulation to the proper length, set in place
- Cover with flashing. The flashing is designed to be a slip and attach fit.
- Slide the flashing up into the slot around the bottom of the sill plate then fasten to the angle at the perimeter of the base channel using 3/16" by 1/2" rivets.



PERIMETER FLASHING INSTALLATION

## IOM 2.6 JOINING UNIT ELECTRICAL CONNECTIONS (IF APPLICABLE)

- Unit sections may have been partially wired during manufacturing. This wiring will need completed after unit sections are joined.
- Insure conduit passing through unit walls and casing and conduit passing from conditioned to unconditioned areas is sealed to prevent air and water migration.

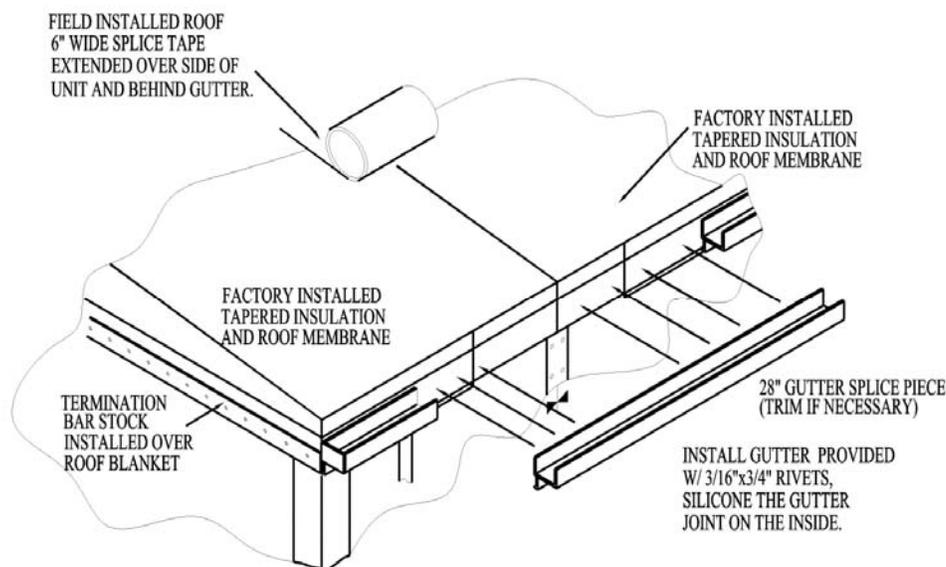
**Caution:** Improper sealing of conduits can cause condensation which can result in serious damage to electrical system through unsealed conduit.

## IOM 2.7 INSTALLING ROOF SPLICES (IF APPLICABLE)

### Unit Roof System Joining Instructions using Stevens EP Flashing Tape

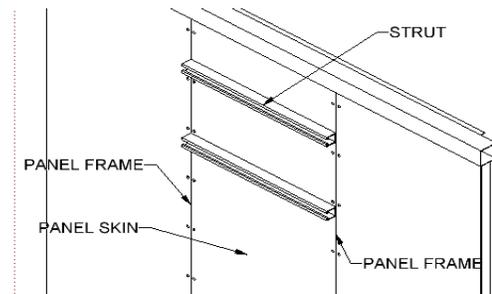
- Prior to joining remove sheet metal and plastic shipping covers. Remove any dirt or debris from factory installed roof membrane with a clean white rag and water. Roof membrane surface at shipping split should be thoroughly dry before proceeding.
- Using brushes provided, apply Stevens Tape Primer to the factory membrane area to be covered then lightly agitate area to be covered with provided scrub pad. Substrate surfaces should appear wet while scrubbing. Always stir primer prior to use. When scrub pad becomes dirty discard appropriately and use a new pad.
- Allow tape primer to flash off (flash off may take longer in cold temperatures). Surfaces should be completely dry to the touch before installing flashing tape.
- Peel off the protective release paper from the Stevens EP Flashing Tape, position over the area to be covered (tape to be centered over the seam) and press the exposed tape onto membrane. Extend tape over both sides of the unit far enough to be just below and behind the gutter splice pieces that will be installed later.
- Immediately roll the flashing tape with a hand roller applying firm pressure over the entire area. Roll across the width of the tape not parallel with it.
- Trim gutter splice pieces if necessary and install over tape on sides of unit with gutter rivets.
- Seal both edges of the flashing tape to the factory installed roof membrane with the Stevens All-Purpose Sealant and seal gutter splice pieces to flashing tape.

Stevens EP Flashing Tape and Tape Primer should be used only when outside ambient air temperature is a minimum 40 degrees F and rising and should not be stored in temperatures below 40 degrees F.



## **IOM 2.8 MOUNTING EQUIPMENT ON UNIT EXTERIOR**

- Do not mount equipment or devices directly to unit panel skin.
- Equipment and devices should be mounted at panel frame joints or strut extending between to panel frame joints.



## **IOM 2.9 INSTALLING CONCRETE IN A FAN INERTIA BASE**

### PREPARATION

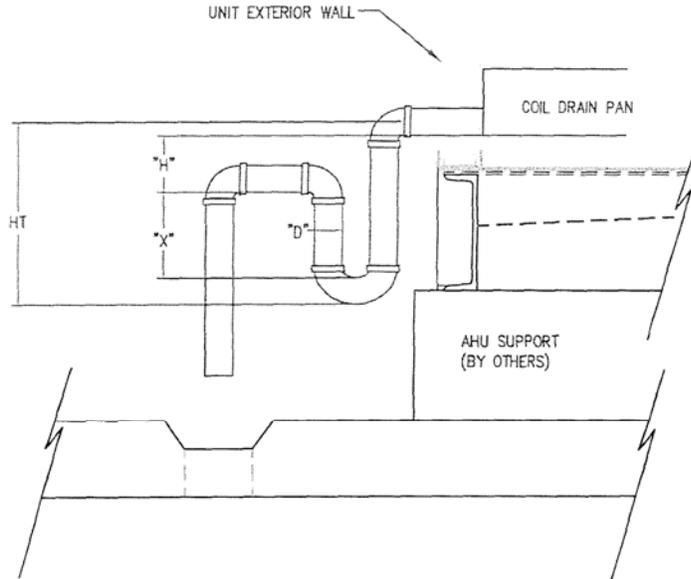
- Examine current fan installation; prepare for concrete.
- Remove shipping tie downs from fan sub-base.
- Verify that a plate is welded to the bottom of the channels, reinforcement bar is welded into base and the component mounting bolts are mounted with the threads up.
- Inspect installation to be sure there is room for the fan to move down when the isolation springs deflect under the added weight of the concrete
- Disconnect canvas connection until the fan base is filled with concrete.

### INSTALLATION

- Fill the fan base with cement to the top of the rectangular tube members and distribute evenly.
- Adjust the isolation springs to level the fan base and align the fan discharge opening at the canvas connection.
- Connect the fan canvas connection and verify that there is ample room for movement of the fan base without applying tension on the canvas connection.

## IOM 2.10 COIL CONDENSATE DRAIN TRAP DETAIL

- Additional support height may be required to allow required trap depth
- Splash guard may be required (by others) at floor drain; to be coordinated with drain supplier



## COOLING CONDENSATE TRAP DETAIL (NEGATIVE STATIC PRESSURE)

(FOR POSITIVE PRESSURE, REVERSE "H" AND "X" DIM'S)

CONDENSATE TRAP DIMENSIONAL PARAMETERS												
SP (*WG)	H (IN)	X (IN)	HT									
			CONDENSATE PIPE DIAMETER "D"									
			3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	
1.5	2.5	1.25	4.88	5.25	5.63	6	6.75					
2.0	3.0	1.5	5.63	6.0	6.38	6.75	7.5					
2.5	3.5	1.75	6.38	6.75	7.13	7.5	8.25					
3.0	4.0	2.0	7.13	7.5	7.88	8.25	9.0					
3.5	4.5	2.25	7.88	8.25	8.63	9.0	9.75					
4.0	5.0	2.5	8.63	9.0	9.38	9.75	10.5	11.75	12.5	13.75	14.5	
4.5	5.5	2.75	9.38	9.75	10.13	10.5	11.25					
5.0	6.0	3.0	10.13	10.5	10.88	11.25	12.0					

UNIT NO.	STATIC PRESSURE

**IOM.3 AHU START-UP INSTRUCTIONS****IOM 3.1 AHU START-UP CHECKLISTS**

The following are recommended to be completed prior to performing start-up:

- \_\_\_\_\_ Duct runs completed and open, not capped off.
- \_\_\_\_\_ Fire dampers open.
- \_\_\_\_\_ Terminal boxes cut in and operative (if applicable)
- \_\_\_\_\_ Outside and return air ducts and openings completed.
- \_\_\_\_\_ Dampers for the above opened and are operable.
- \_\_\_\_\_ Wiring completed – motors, automatic filters, lighting and electrical portion of the controls.
- \_\_\_\_\_ Proper fuses and starter heaters installed.
- \_\_\_\_\_ Main power source been connected and checked out.
- \_\_\_\_\_ Pneumatic piping completed to associated controls and actuators.
- \_\_\_\_\_ Clean dry control air connected if applicable at design air pressure.
- \_\_\_\_\_ Filters and filter clips are properly installed.
- \_\_\_\_\_ The condensate drains are properly trapped and piped.
- \_\_\_\_\_ The air handling units are cleaned out; cleared of all trades material and equipment.

Air Enterprises recommends the following trades people at the jobsite at the time of start-up: Electrician, Temperature Control Technician, and AHU installation personnel.

## FAN SERVICE CHECKLIST

Job# \_\_\_\_\_ Unit# \_\_\_\_\_ Service Technician: \_\_\_\_\_ Date: \_\_\_\_\_

Service Address: \_\_\_\_\_

<b>Fan:</b>	MFG.	Type	
	Model #	Serial #	
	I.D. #	Rotation	Speed

<b>Motor:</b>	MFG.	Type		
	Model #	Serial #		
	Frame	RPM	HP	SF
	Volt	Amp		
	Measured Amps	% Loaded		

<b>Drive:</b>	Drive Sheave	Driven Sheave	
	Belt Size	Qty.	Matched set?
	Sheaves aligned?	Belts tight?	

<b>Bearings:</b>	MFG.	Condition		
	Type	Size		
	Lubrication	% Full		
	Name fixed brg.	% float, opp.brg.	+	-
	Both brgs. set & locked?	Seals free?	Fan turn free?	

- General:**
- Check all assembly bolts and fasteners for tightness.
  - Check for equal fan impeller clearance & ensure set screws are tight.
  - Check inlet vortex and controls if applicable.

**Start-Up:** Jog to check rotation \_\_\_\_\_ Performed by: \_\_\_\_\_  
 Jog VFD if applicable \_\_\_\_\_ Performed by: \_\_\_\_\_  
 Run fan at full volume for 20 minutes, if possible, and retention belts if necessary

Additional services performed or required to be performed: \_\_\_\_\_

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## IOM 3.2 AHU START-UP PROCEDURES

The following recommendations are to be completed prior to performing initial start-up. If these instructions or any other part of the manufacturer's instructions supplied by Air Enterprises are not clear, contact us for clarification or assistance.

- Lock out fan disconnects.
- Check out fans in the following manner:
  - o Verify shipping tie down supports were removed by installer.
  - o Record fan and motor nameplate data.
  - o If split pillow block bearings are installed, perform the following:
    - Remove bearing housing caps. (**CAUTION:** Make sure you keep the inside of the bearing housing clean)
    - Check for proper amount of lubrication: approximately ½ full. Adjust as necessary.
    - Check that a stabilizer ring has been installed in only one (1) of the bearing housings.
    - Check both bearings to be sure that a locking tab has been set on the adapter ring lock nut.
  - o Or, If one (1) piece pillow block bearings are used:
    - Verify that the bearing was lubricated. (The seals will purge some grease at start-up.)
    - Make sure all locking collars and setscrews are properly set.
  - o Check sheaves and belts.
    - Check sheave mounting bolts.
    - Check sheave alignment.
    - Check for proper belt tension and adjust as necessary. The belts on the fan drive are usually shipped loosened (not fully tensioned).
  - o Check all mounting bolts for tightness.
    - Fan bearing support.
    - Bearing mounting bolts.
    - Fan casing bolts.
    - Fan mounting bolts to fan base.
    - Motor ramp-mounting bolts.
    - Adjustable motor base mounting bolts.
    - Motor mounting bolts.
    - Thrust arrestor mounting bolts (if applicable).
  - o Fans - check all mounting bolts for tightness, cont.
    - Belt guard-mounting bolts.
    - Isolation spring mounting bolts.
    - Remove inlet screen and check hub set screws.
    - Replace inlet screen and check all screen fasteners.
- Check all other components for shipping blocks and/or perform start-up checks as listed in the manufacturer's literature supplied in the maintenance manual.

**Example:** VIFB (vertical face and bypass coils) have shipping bolts on the header that must be removed before start-up.

- Check all electrical controls and safeties.
  - o If by others, make sure they are 100% complete before energizing.
  - o If supplied by Air Enterprises:
    - Check all electrical connections for tightness.
    - Check fuse and heater sizing.
    - Check electrical interlocks.
    - Remove fan lock outs and prepare for full volume run test.
- Make sure the full volume of air can be moved as designed.

**CAUTION:** Abnormal air restriction (ducts partially blocked, dampers not properly under control), can result in dangerous conditions and damaged product (collapsed or popped duct, crashed damper banks.)

  - o If variable air volume, start at minimum volume and slowly increase to maximum volume. Monitor discharge static pressure and do not exceed the maximum that the system can handle.
- Turn on unit and check the following:
  - o Record motor line voltage and amperage at full volume and compare to motor nameplate data.
  - o Take a pressure profile of entire air handling unit at full volume and record on a skeleton drawing of the air handler.
  - o Compare total, external, and internal pressures to those noted on the unit notes.
  - o Date, compile and send recorded data, pressure profile, start-up checklist, and total volume CFM (if available), to Air Enterprises for our records.
- Start-up all other equipment as per start-up procedure listed in manufacturer's literature in the maintenance manual.

**IOM.4 GENERAL UNIT MAINTENANCE**

The following is the recommended procedure for general maintenance of an Air Enterprises custom AHU.

**AHU GENERAL**

- **Check all casing penetrations** (piping, electrical, etc.) insure they remain properly sealed. This is especially important if any work was done on the piping or electrical system that may have affected the penetration seals. Check for damaged or loose skins that may need repaired or replaced.
- **Check all doors** to be sure the door handles are not bent, broken or missing and are adjusted so the doors seal tightly and uniformly around the entire frame. Check door hinges and replace them if they are sprung or severely worn. Make sure door restraints (when required ) are in place and in good working order. Check the windows for cracks or leaks. Replace broken or fogged windows. Clear the door jamb of any dirt or debris. Check the door gasket for tears, deterioration, looseness and contact integrity. New gasket, windows and handles can be purchased from Air Enterprises. Please specify door thickness when ordering door gasket of door handles - and window size and type when ordering windows.
- **Pan sections** have auxiliary drains for removal of water that may collect as a result of coil cleaning of housekeeping processes. The drain caps should remain on until such time that draining is required. Make sure all drains are clear of debris. Inspect inside the unit compartments and clean as required. Inspect for mold growth in areas of high humidity. If evidence of molds are present, consult an industrial hygienist for proper clean up methods that fit your application. Painted steel pans may require de-scaling, cleaning and painting.
- **If maintaining and an operating system**, check the following items before turning the system off. Record the filter bank pressure drops, look at the fan operation, the damper positions, the condensate coming off of the chilled water or DX coils, and the unit operations in general. Listen to the sound of the fan, motor and belts as an assembly for any noises. Listen for air leaks. Feel the outside of the air handling unit and the fan assembly, if possible, for unusual or alarming vibrations. Record unusual findings. Check all of these conditions after the maintenance has been completed and compare them to your original findings.

## FAN SECTION

- **Before entering the pan compartment**, make sure the fan is de-energized and the fan disconnect is locked out to disable the fan motor from being energized during service. Verify that the fan rotation is correct during coast down. After ensuring that the fan has come to a complete stop, enter the fan compartment and perform initial visual inspection of the entire fan assembly - looking for any signs of abnormality.
- **Check all structural components.** Check for tightness on all fan assembly bolts and bolts used to fasten components such as the fan, vibration isolators, and motor of devices to the fan base. Check metallic components for corrosion, cracks or signs of fatigue or stress. If an inertia base is supplied, check the concrete for structural integrity.
- **Inspect the flexible canvas connection** for tears, punctures or signs of weakness. Replace the canvas at the first signs of fatigue.
- **If a transitional evase has been installed** at the fan outlet, inspect it in the corners for signs of stress cracks. Small cracks can be stopped by drilling a stop hole at the end of the crack and installing a reinforcement piece across the crack. Large cracks require replacement of the evase.
- **If a diffusing screen is installed** (either flat or crescent shaped types), check the perforated screen for cracks and check the assembly and mounting bolts for tightness. Apply a thread locking compound to bolts that vibrate loose.
- **Inspect the fan shaft and wheel.** Look for signs of corrosion, stress, cracks or fatigue. Check the wheel set screws for tightness. Clean any dirt or water from the fan scroll.
- **If the fan is equipped with an inlet vortex** for variable volume control, cycle the vortex blades through a complete cycle to see that operate freely and smoothly. Check the blades to make sure they are not loose from worn bushings or loose linkage. If the fan is double wide, double inlet type, make sure that the two sides operate in unison.
- **Bearing inspection.** Observe the general condition of the bearing and grease. Make sure the lock ring is tight and a tab for holding the lock ring is in place. Make sure the aluminum seal rings are rotating freely and are not rubbing the cast housing. Make sure one of the bearings has a stabilizer ring installed. If the fan is to be reused, bearings should be replaced if they have more than 5000 operating hours. Check the O&M manual for frequency of lubrication guidelines. Recommended grease is Shell Alvania EP Grease 2 NLGI Grade 2 or equivalent.

## MOTORS

- **All Motors must be free of oil, dust, dirt, water and chemicals.** Verify that the motor leads have no voltage applied to them. Measure the insulation resistance value with a megohmmeter and log this data for future reference and to use as a base line to evaluate winding insulation condition as part of your inspection. Evaluate the motor life expectancy and efficiency to determine if replacement is warranted.

## MOTOR BASE

- **Air Enterprises may provide either of two motor base types**, a manual tension of an automatic tension base. Inspect for broken adjusters or excessive wear. Replace as required.

## V-BELT DRIVE INSPECTION AND MAINTENANCE

- **Remove the belt guard top and inspect the belts and belt tension.** Replace the entire set of belts, if any belts are hardened, cracked, ruptured, split, distorted, softened by oil deterioration, burned by overheating or show signs of excessive wear. Inspect the belt guard for signs of belt sheave contact, repair any condition that caused contact.
- **Check the sheave grooves with a sheave gage for wear.** If variable pitch sheaves are installed, check all set screws for tightness and verify pitch diameter is equal in all groves.

## FAN AND MOTOR ASSEMBLY

- **Fan & motor vibration analysis** - inspect to evaluate fan and motor condition.
- **Fan assembly springs.** The fan assembly is mounted on vibration isolations springs. The adjustable operation height is factory set but may need adjusted at some point in the future. Check springs for compression or weakness. Insure that the canvas connection between the discharge wall and fan is not placed in tension on any axis.
- **Make sure all protective screens and belt guards** are in place and securely fastened prior to placing the system back into service. Replacement of lost or broken protective screens is recommended.
- **Fan Assembly Check List:**
  - Lock out disconnect
  - Inspect assembly
  - Check all fasteners for tightness
  - Inspect canvas connection and evase
  - Inspect and operate inlet vortex of applicable
  - Inspect fan bearing
  - Perform V-belt inspection
  - Perform motor inspection
  - Place in operation and check component performance
- **V-Belt Drive Check List (when applicable):**
  - Verify unit locked out for safety
  - Inspect belts and sheaves
  - Replace worn parts
  - Check sheaves alignment - 4 point method
  - Tighten belts
  - Tighten motor mount bolts
  - Make sure belt guard is in place

## COILS

- **Visually inspect coil fins, coil tubes, and return bends** for signs of corrosion and or deterioration. Look for signs of leaks. Check the piping, be sure that it is properly secured so it does not put undue strain on the coil connections. Check the piping where it penetrates the unit casing to see that it is properly sealed. Coil fins must be clean to maximize coil performance and keep the air pressure drop within 110% of the original pressure drop. Dirty or soiled fins can provide an environment for odor and bacteria to grow and be spread throughout the air handling system. Replace coils which have rusted out steel casings, deteriorated fins, excessive internal water pressure drops or excessive air pressure drop.
- **Cooling coil drain pans** should be cleaned of any foreign matters that may plug the condensate drain. Verify that the condensate drain connections drain connections are open for free water flow. New positive draining coil pans are available. Inspect aluminum drain pans for corrosion or pitting.
- **If steam coils have been supplied**, make sure the condensate trap is properly installed. Check for steam and condensate leaks. Check the trap to be sure that it is opening properly and that the condensate does not leak through it is closed.
- **Coil removal is usually done through a removable panel**, but sometimes is through the access doors. If coils are to be changed out, make sure access is available.
- **Coils Check List:**
  - Inspect coil fins, tubes and bends
  - Look for leaks
  - Verify piping penetration seals
  - Clean coils, if required
  - Clean drain pan of debris
  - Check coil freeze protection
  - Check steam traps
  - Check control valves, operation and calibration

## FILTERS

- **The universal galvanized holding frames** are supplied with filter clips in the quantity of four (4) per frame.
- **Filter frame gasket** must be in tact, not dried, cracked or torn. The filter bank flashing must be soundly fastened with no leak paths. All edges should be sealed with approved caulking or sealant.
- **Filter clips** must remain in good working condition in the quantity recommended by the manufacturer.
- **A magnehelic gage** been installed to measure the pressure drop across the filter bank. The magnehelic gage requires minimal maintenance. Occasionally check and zero the pointer by setting the plastic valves to vent and adjusting the zero screw on the bottom of the face plate. Be sure to set plastic valves back to line when completed. Check all tubing connections for tightness. Check the gage cover to be sure it is securely in place and air tight. Check the tubing ends and be sure they are not plugged and remain perpendicular to the air flow. The pressure drop reading on the magnehelic is a pressure made up of the final filter pressure drops.
- **Filter Check List:**
  - Check gasket
  - Replace filters, as required
  - Replace missing filter clips
  - Zero magnehelic gage

## DAMPERS

- **Replace damaged or missing blade seals.** Wipe away any dirt accumulation from the side seals.
- **Cycle the dampers by hand with the damper actuators,** temporarily disconnected, checking for smooth operation and making sure the dampers will seal tightly when closed. When operated to full open, the damper blades do not always rotate to a position 90 degrees from their closed position. Check the damper and actuator mounting, tighten any loose fasteners and replace any missing fasteners. Reconnect the damper actuator and cycle the damper with the actuator checking for calibration of the actuator and proper damper seal at the closed position. Check all damper and actuator linkages for wear and to insure all connections remain solid. Replace any worn linkages and tighten any loose linkage connections.. If the dampers are mounted in the unit floor, insure the openings have protective grating securely installed. Replace any severely worn, rusted, or damaged dampers.
- **Dampers Check List:**
  - Remove dirt and debris from dampers
  - Cycle dampers by hand
  - Check seals and replace as necessary
  - Inspect and repair linkage as necessary
  - Cycle dampers with actuator
  - Check actuator operation and calibration

## ENERGY RECOVERY WHEELS

- **Inspect media.** If more that 20% of the surface area is damaged or blocked, media may need replaced.
- **Inspect the motor,** gear box and drive system for excessive wear.
- Inspect the seals. Missing or worn seals must be replaced.