

— AIR HANDLERS —

SECTION #9

INSTALLATION, OPERATION AND  
MAINTENANCE INFORMATION

FOR:

OUTDOOR AIR HANDLERS

**CALL US FIRST**

**USA COIL  
& AIR**

**1-800-USA-COIL**

(800-872-2645)

(610) 296-9668

U.S.A. Coil & Air, Inc.

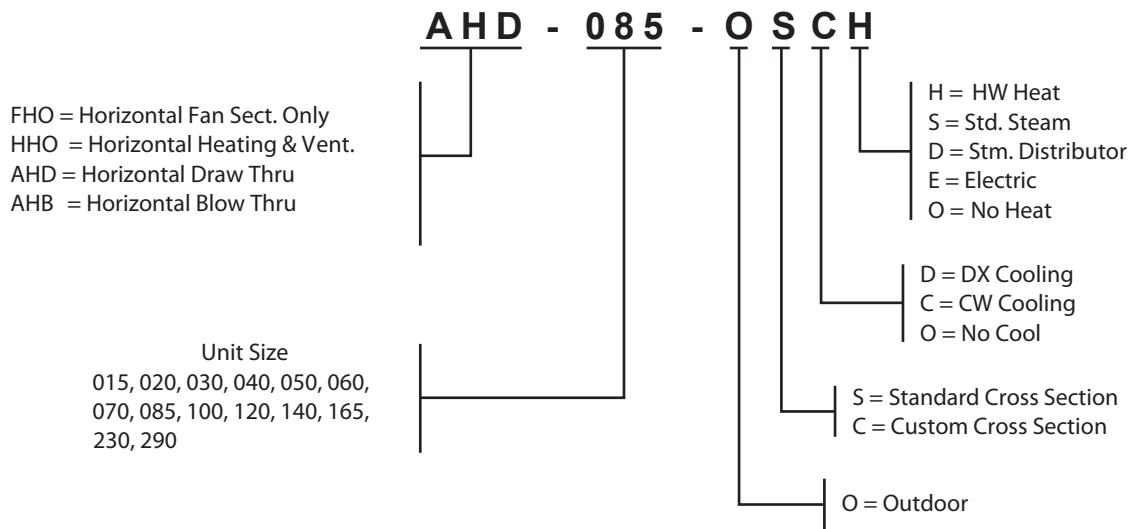
P.O. Box 578

Devault, PA 19432

# Table of Contents

Nomenclature .....	2	Fan Wheel Alignment .....	14
General Information .....	3	Fan Operating Limits .....	16
Receiving and Handling .....	3	Fan Vibration Levels.....	17
Unit Storage .....	3	Service and Maintenance.....	18
Installation Guidelines .....	4	Periodic Service and Maintenance.....	18
Service Clearances .....	4	Ball Bearing Lubrication.....	18
Rigging .....	4	Fan Drive Adjustments .....	18
Curb Mounting and Leveling.....	5	Drive Belt Adjustments.....	21
Section Assembly.....	5	Front Load Filter Option .....	22
Access Doors and Panels.....	6	Winterizing Water Coils .....	23
Duct Connections .....	7	Coil Maintenance .....	23
Dampers and Hoods .....	7	Component Removal & Replacement.....	24
Mounting Actuators.....	8	Roof Curb General Description.....	26
Face and Bypass Section Mounting .....	8	Curb-Ready Air Handler .....	26
Piping Vestibules.....	8	Curbing Kit.....	26
Piping and Coils .....	8	Curb Kit Assembly.....	29
Drain Pan Traps.....	11	Roof Curb with a Vestibule Assembly .....	29
Internal Isolation Assembly Adjustment.....	11	Prepare the Unit for Installation on Curb .....	29
Electrical Installation.....	12	Install Unit on Roof Curb.....	30
Operation Guidelines .....	13	Installation of Piping and Wiring .....	31
Startup Checks.....	13	Warranty .....	32



# Model Number Designation



# General Information

The system design and installation must follow accepted industry practice, such as described in the ASHRAE Handbook, the National Electric Code, and other applicable standards. The installation of this equipment must be in accordance with regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes.

Installation and maintenance must be performed by qualified personnel familiar with applicable codes and regulations, and experienced with this type of equipment. Sheet metal parts, self-tapping screws, clips, and such items inherently have sharp edges, and it is necessary that the installer exercise caution.

 <b>CAUTION</b>
SHARP EDGES AND COIL SURFACES are a potential injury hazard. Avoid contact with them.
 <b>ATTENTION</b>
Les bords tranchants et les surfaces des bobines sont un risque de blessure. Ne les touchez pas.

## Receiving and Handling

1. Carefully check items against the bills of lading to verify all crates and cartons have been received. Carefully inspect all units for shipping damage when received. Report damage immediately and file a claim for damage with the carrier.
2. USA Coil air handler units are constructed of heavy-gauge galvanized steel and are thoroughly inspected before leaving the factory. Care must be taken during installation to prevent damage to units.
3. Take special care when handling the blower section. All fans are dynamically balanced before leaving the factory. Rough handling can cause misalignment or a damaged bearings or shaft. Carefully inspect fans and shaft before unit installation to verify this has not happened.
4. If necessary, screws, bolts, etc., for assembly of sections are supplied in a bag attached to each section. All necessary gasketing is applied in the factory for section to section mounting. Units require caulk sealant between sections.

## Unit Storage

Store unit on a level surface. If air handling units are to be stored for any period of time, it is important to periodically rotate the fan wheel. The fan wheel should be periodically rotated to prevent permanent distortion of drive components. In addition, grease may settle in the lower part of the bearing, which may lead to oxidation on the upper portion of the bearing surface. It is also important to keep the fan bearings lubricated.

# Installation Guidelines

## Service Clearances

In addition to providing adequate space around the unit for piping coils and drains, access is always required on at least one side of the unit to allow for regular service and maintenance. Filter replacement, drain pan inspection and cleaning, fan bearing lubrication and belt adjustment are examples of routine maintenance that must be performed. Sufficient space must also be provided on the side of the unit for shaft removal and coil removal if necessary. Space at least equal to the length of the coil is required for coil removal.

See Figure 1 for servicing space requirements.

At least 54" of clearance must be maintained in front of electrical power devices. Electrical power devices that are mounted on the side of the unit are typically up to 12" deep. See Figure 2.

Figure 1. Servicing space requirements

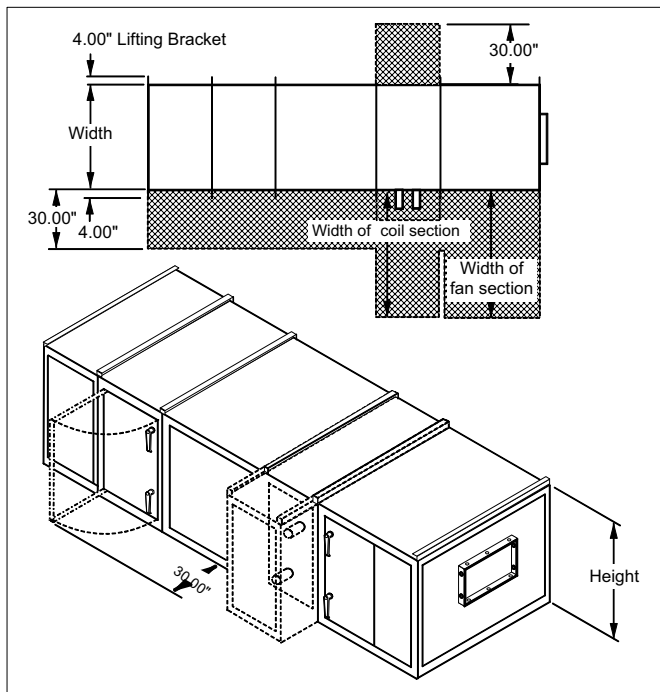
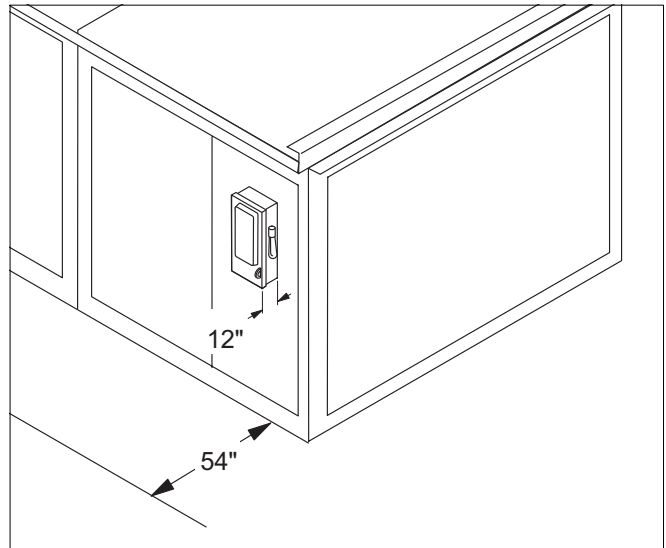


Figure 2. Service clearance for electrical power devices

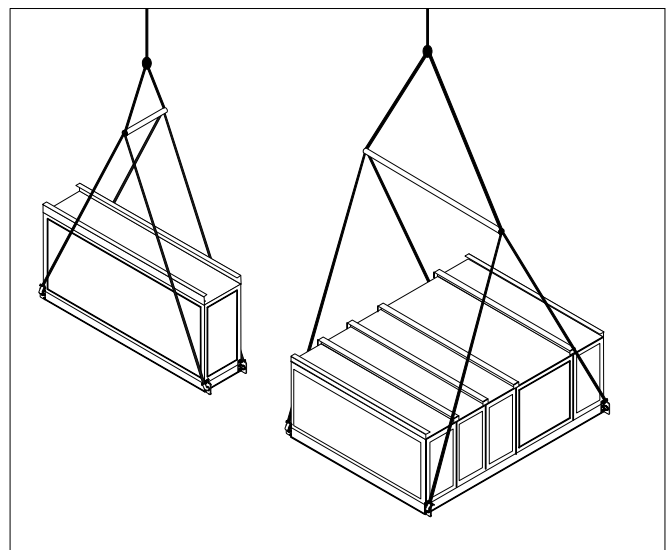


## Rigging

USA Coil air handlers ship completely assembled, or in sections. **The unit must be rigged as it ships from the factory. Do not rig units after assembly.** Units are provided with a factory installed base rail and can be lifted using the 2" diameter lifting holes located in the corners of each shipping section.

To prevent damage to the unit cabinetry, use spreader bars. Spreader bars must be in position to stop cables from rubbing the frame or panels. Before hoisting into position, test lift for stability and balance. Avoid twisting or uneven lifting of the unit.

Figure 3. Unit and section rigging

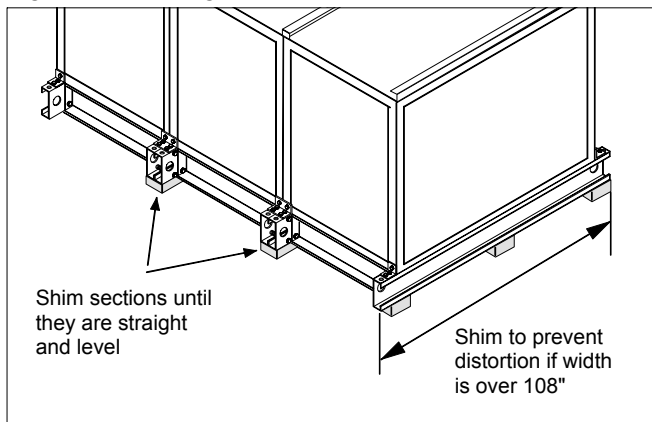


## Curb Mounting and Leveling

Do not place a USA Coil unit over an open curb unless it is equipped with a curb-ready base. Installation instructions for mounting units on a roof curb are provided in this manual. Make provisions under the unit to divert any moisture from entering the building below.

**For units without roof curb mounting, place the equipment on a flat and level surface. Where surface irregularities exist, shim the base of the unit at one or more points along the length of the rails to prevent distortion or sagging. Uneven or distorted sections will cause misfit or binding of the doors and panels and improper draining of drain pans. See Figure 4.**

Figure 4. Leveling the unit



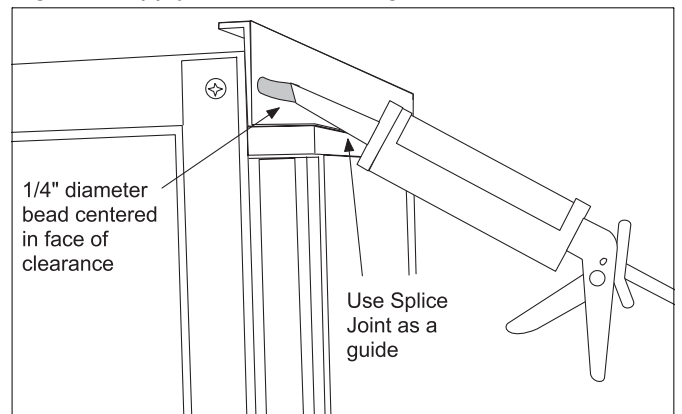
## Section Assembly

If the unit is shipped in more than one shipping section, rig each section into position separately. Shipping sections are provided with a connection splice joint attached on the leaving air side of the shipping section that seals against the frame channel on the entering-air side of the adjoining section. The splice joint is insulated, and provides an air-tight seal between two sections once they are assembled together. The Splice Joint must be aligned to seat into the mating gasket to provide an air seal. If the Splice Joint was bent during shipping or rigging, verify it is restored to its original position. *Figure 6 on page 5.*

Use the following procedure to assemble shipping sections:

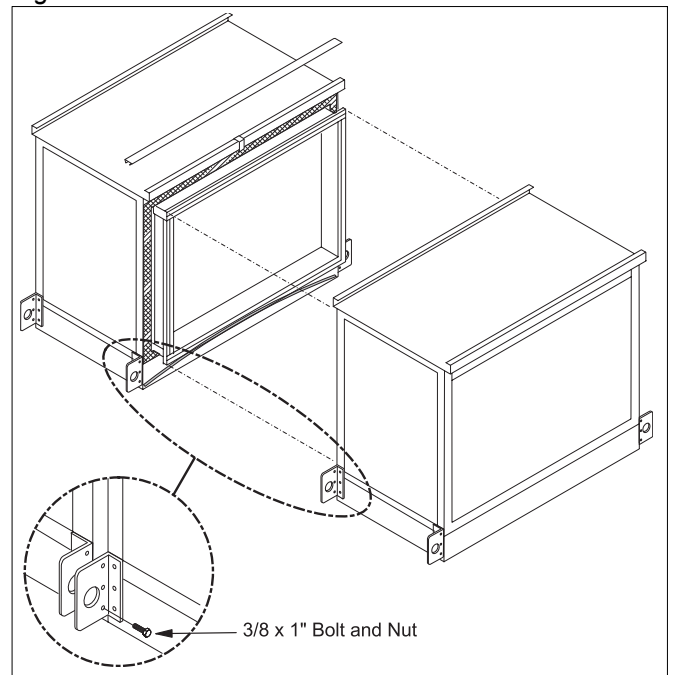
1. Caulk all assembly joints of the unit. The mating faces of the cabinet must have at least a 1/4 inch diameter bead of sealant applied before the sections are joined. Use the splice joint as a guide for application of the sealant. *See Figure 5.*

Figure 5. Apply sealant to mating faces



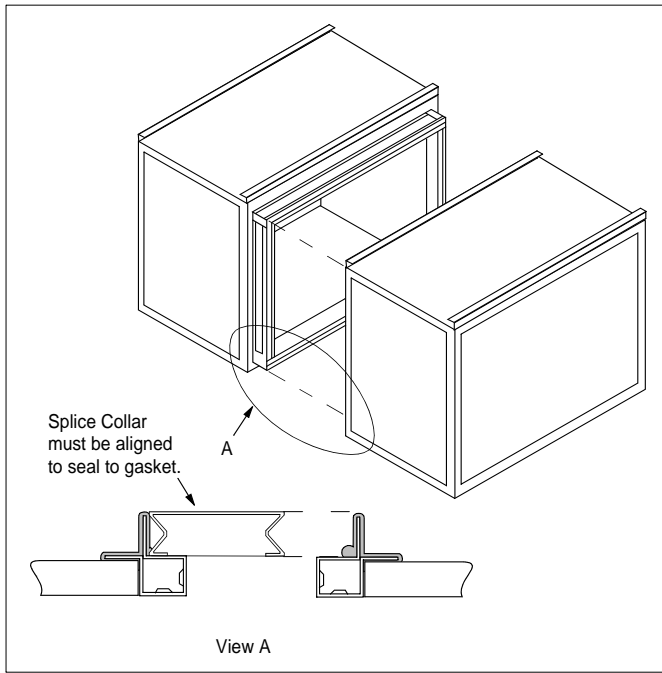
2. Pull sections together to fasten. Use straps and a ratchet to help pull the sections together securely. Apply sealant to any gaps that may admit moisture.
- 3a. Fasten base rails together first using the 3/8"-16 by 5" bolts found in the splice kit provided with the unit. *See Figure 6.* To fasten 2 shipping sections together, 4 bolts are needed (two on each side of the unit). The bolts are run from one base rail into the other and fastened with a nut. Complete each section bottom and top before attaching additional sections.

Figure 6. Fasten bottom of section



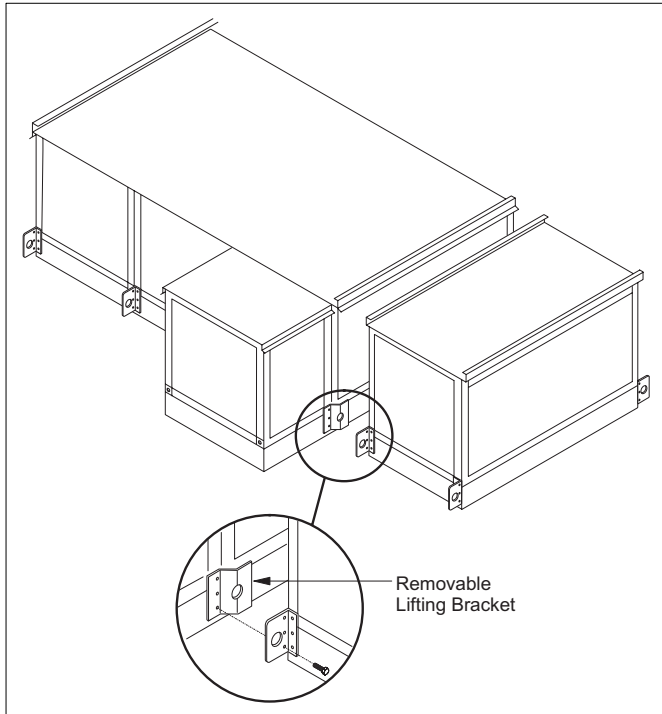
- 3b. If desired, shipping sections for non curb-ready units can be fastened together internally. Internal fastening is achieved by running field provided #10 sheet metal screws or drill screws (4" long maximum) through the interior frame channel of one unit into the splice joint of the neighboring section.

Figure 7. Internal fastening



3c. Units with curb-ready bases and vestibules must be handled so that the lifting bracket can be removed after the unit is placed on the curbing. Remove the lifting bracket that projects inward over the curbing. Save the self tapping screws. When the adjacent section is placed in position, use self tapping screw to secure the bases together.

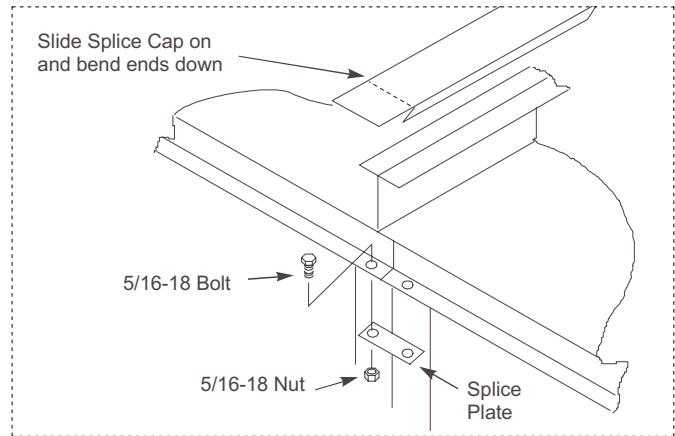
Figure 8. Remove vestibule lifting bracket



4. Check that the sealant is compressed between the mating channels when the unit sections are joined. Touch up any places where gaps are noted. After sections are seated tightly together, slip the splice cap over the top panel

flanges. Bend the ends of the splice cap down to secure in place. Assemble the small splice plate at the top rail to secure the sections together at the top. Use 5/16" bolts. See Figure 9.

Figure 9. Splice cap & splice plate



## Access Doors and Panels

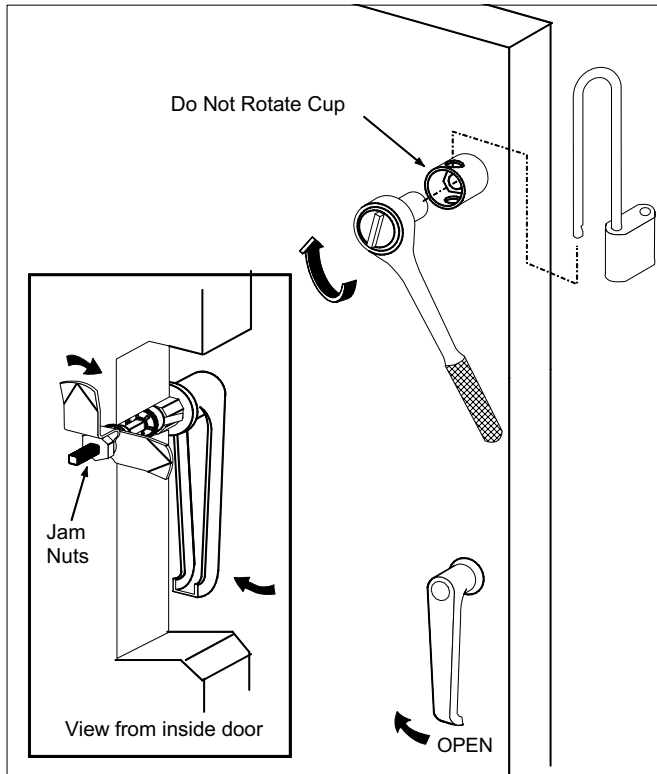
For routine maintenance, access is normally obtained through access doors or by removing side panels. Removing all flat head fasteners along the sides of a panel will allow it to be removed.

Fan and filter sections are always provided with a service door on one side of the unit. If requested on order, doors can be provided on both sides of the unit. Optional service doors are available for most section types, and are provided based on customer request.

**NOTE:** Opening fan section doors requires the use of a 1/2" socket wrench. This satisfies ANSI standards and other codes that require the "use of tools" to access compartments containing moving parts or electrical wiring. See Figure 10.

1. Remove padlock if one is present.  
**CAUTION: DO NOT attempt to rotate the cup. Damage to the unit will occur.**
2. Insert 1/2" socket into cup and rotate 1/4 turn clockwise as shown in Figure 10. If the cup and handle are on the left side of the door, rotate 1/4 turn counter-clockwise.
3. Rotate door handle 1/4 turn clockwise, then 1/4 turn counter-clockwise to release any internal pressure or vacuum and open the door. If the cup and handle are on the left side of the door, rotate door handle 1/4 turn counter-clockwise, then 1/4 turn clockwise.
4. To prevent air leakage, tighten the door panels by adjusting the jam nuts.

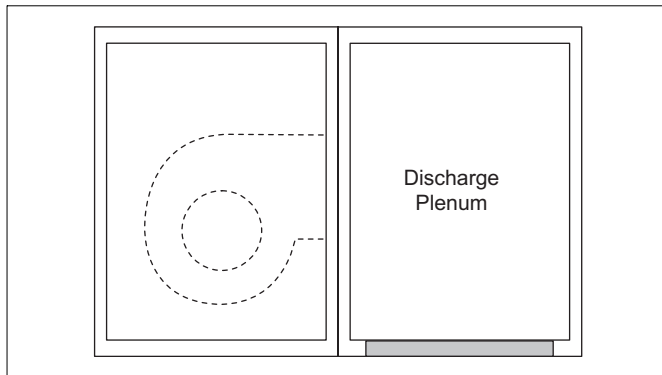
Figure 10. Opening fan section door



## Duct Connections

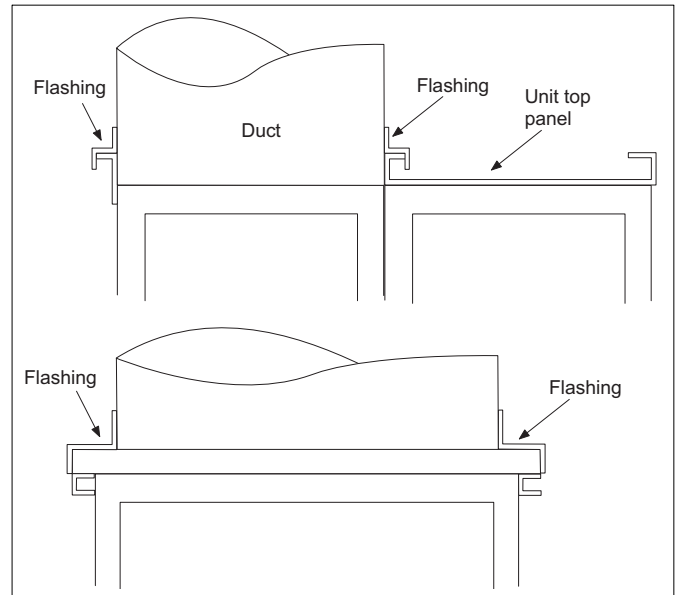
Flexible connectors should be used on the outlet and inlet duct connections of all units. Do not position down flow fans over air ducts that are routed down into the building. A discharge plenum is recommended when bottom connections are necessary. See Figure 11.

Figure 11. Discharge plenum



If the unit has a top mixing box or economizer damper, or a top duct connection, flashing must be field fabricated and installed to divert moisture from the connection. The flashing must lap over the standing seams of the top panels. The flashing must also lap over the side edges of the unit. See Figure 12.

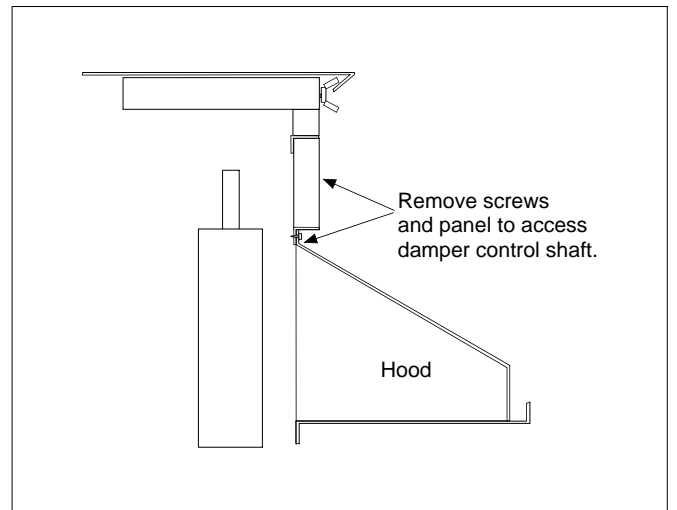
Figure 12. Flashing over top panels and sides of units



## Dampers and Hoods

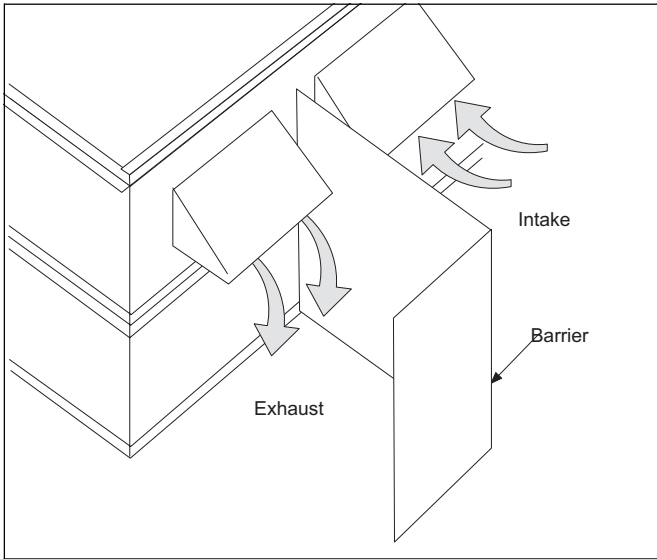
Side dampers may be provided in the mixing box and economizer sections of units. When dampers are provided, a removable panel is located above the weather hood to provide access to the damper drive shaft. Other access may be available depending on the specific construction of the unit. See Figure 13.

Figure 13. Filler panel over the weather hood



When units are ordered with exhaust hoods and intake hoods adjacent to each other, a field supplied barrier is recommended to prevent re-circulation of exhaust air into the intake openings. See Figure 14.

Figure 14. Field installed barrier between hoods



## Mounting Actuators

The installing contractor is responsible for the mounting of all field installed actuators. No provisions are made for the location of these actuators due to the number of options and arrangements available and the variety of specific applications. Typically, actuators are mounted inside the cabinet. Provide proper support for the actuator to avoid excessive stress in the cabinet, linkage, or damper shafts.

**Note:** Damper blades are at full flow when open to 70 degrees. Do not open blades further than 70 degrees.

Fresh air and return air dampers can be linked together and driven from the same actuator if the dampers are the same size. If the dampers are different sizes, they must be driven by separate actuators and controlled appropriately. Exhaust dampers are always driven by a separate actuator.

A typical rotary electric actuator can handle up to 40 sq. ft. of damper. For pneumatic actuators, allow 5 in.-lb. per square foot of damper area.

## Face and Bypass Section Mounting

Internal and external face and bypass sections are mounted together using the instructions for horizontal components and do not require additional instruction. USA Coil air handlers are provided with a bypass duct that is integral to the unit construction and requires no field assembly.

Face and bypass dampers may or may not be linked together. When dampers are placed before a single bank of coils, they are always linked together and require a single actuator. When dampers are bypassing a stacked or staggered coil, the dampers are not linked and will require multiple actuators.

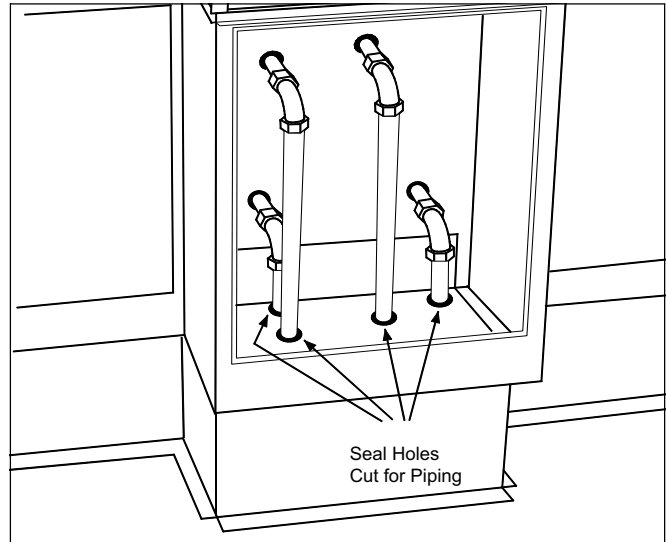
Face and bypass dampers have a torque requirement of 10 in.-lbs. per square foot of damper face area.

## Piping Vestibules

The openings for routing the field piping must be cut as required in the field for units that include a piping vestibule. Carefully seal passages cut through the panels to prevent air leakage. A single metal thickness pan is provided in the bottom of the curb mounted vestibule. The pan can be removed if necessary. If holes are cut into the pan for a piping passage, seal the holes to prevent moisture leakage.

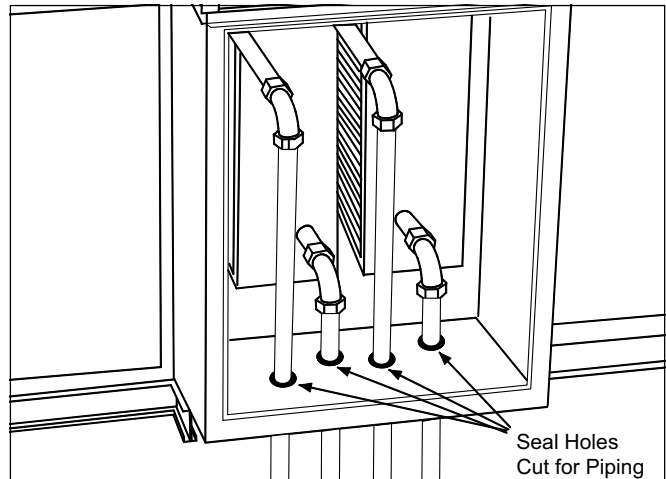
See Figure 15.

Figure 15. Seal holes for piping - curb mounted units



For units with standard base rails, the vestibule is open to the coil section so all holes must be sealed to prevent air leakage.

Figure 16. Seal holes for piping - standard base rail units



## Piping and Coils

Follow applicable piping design, sizing, and installation information presented in ASHRAE Handbooks in the design and installation of piping. Observe all local codes and industry standards. Undue stress should not be applied at the connection to coil headers. Pipework should be supported independently of the coils.



## Water Cooling Coils

**Note:** It is recommended that Glycol be used in water coils for outdoor air handlers. Power failures and other mechanical issues can expose coils to freezing temperatures.

1. Water supply, water return, drain, and vent connections extend through the end panel of the coil section. All connections are labeled on the end panel.
2. Water supply and water return connections are typically male N.P.T. iron pipe.
3. When installing couplings, do not apply undue stress to the connection extending through unit panel. **Use a backup pipe wrench to avoid breaking the weld between coil connection and header.**
4. Follow recommendations of the control manufacturer regarding types, sizing, and installation of controls.

## Direct Expansion Coils

1. The coil distributor and suction connection extend through the end panel of the coil section.
2. Check nozzle in distributor for proper tonnage.
3. When a thermostatic expansion valve is supplied with the unit, it will be located outside the unit and connected directly to the distributor (except on units with piping vestibules). Do not apply heat to the body of the expansion valve.
4. The thermostatic expansion valve must be of the external equalizer tube type. Connect the 1/4-inch diameter external equalizer tube provided on the coil to connection on expansion valve.
5. Use care when piping up the system to see that all joints are tight and all lines are dry and free of foreign material. For typical refrigerant piping, see condensing unit product manual.

## Steam coils (refer to Figure 17 on page 10)

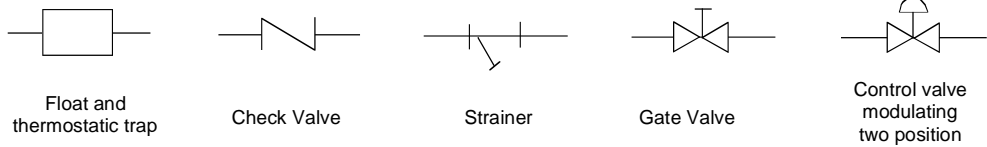
**Note:** Steam traps should not be placed outdoors.

1. All steam coils in units are pitched toward return connection.
2. Steam supply and steam return connections are typically male N.P.T. iron pipe and are labeled on the end panel of coil section. Connections extend through coil section end panel.
3. When installing couplings, do not apply undue stress to the connection extending through unit panel. **Use a backup pipe wrench to avoid breaking the weld between coil connection and header.**
4. Support piping independently of coils and provide adequate piping flexibility. Stresses resulting from expansion of closely coupled piping can cause serious damage.
5. Do not reduce pipe size at the coil return connection. Carry return connection size through the dirt pocket, making the reduction at the branch leading to the trap.
6. Install vacuum breakers on all applications to prevent retaining condensate in the coil. Generally, the vacuum breaker is to be connected between the coil inlet and the return main, the vacuum breaker should be open to the

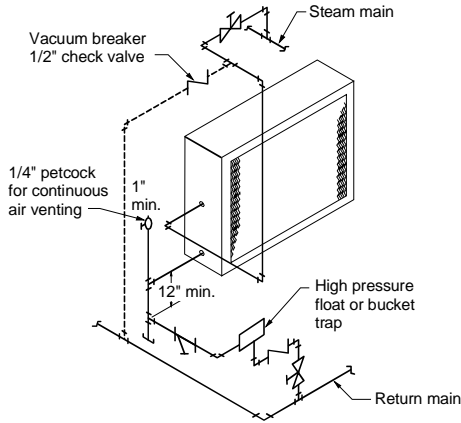
atmosphere, and the trap design should allow venting of large quantities of air.

7. Do not drip supply mains through the coil.
8. Do not attempt to lift condensate when using modulating or on/off control.
9. Size traps in accordance with manufacturers' recommendations. Be certain that the required pressure differential will always be available. **Do not under-size.**
10. Float and thermostatic or bucket traps are recommended for low pressure steam. On high pressure steam, bucket traps are normally recommended. Thermostatic traps should be used only for air venting.
11. Bucket traps are recommended for use with on/off control only.
12. Locate traps at least 12 inches below the coil return connection.
13. Multiple coil installation.
  - a. Each coil or group of coils that is individually controlled must be individually trapped.
  - b. Coils in series: Separate traps are required for each coil, or bank of coils, in series.
  - c. Coils in parallel: A single trap may generally be used but an individual trap for each coil is preferred.
  - d. Do not attempt to lift condensate when using modulating or on/off control.
14. With coils arranged for series airflow a separate control is required on each bank or coil in the direction of airflow.
15. Modulating steam valves are not recommended on high pressure systems.
16. Modulating valves must be sized properly. **Do not under-size.**
17. Freezing conditions (entering air temperatures below 35°F).
  - a. Steam coils are strongly recommended.
  - b. 5 psi steam must be supplied to coils at all times.
  - c. Modulating valves are not recommended. Control should be provided by face and bypass dampers.
  - d. Consideration should be given to the use of two or three coils in series with two position steam control valves on that coil or coils which will be handling 35°F or colder air. The desired degree of control can be attained with a modulating valve on the downstream coil.
  - e. Thoroughly mix fresh air and return air before it enters the coil. Also, temperature control elements must be properly located to obtain true air mixture temperatures.
  - f. As additional protection against freeze-up, the trap should be installed sufficiently below coil to provide an adequate hydrostatic head to provide removal of condensate during an interruption in the steam pressure. Estimate three feet for each 1 psi of trap differential required.
  - g. On startup, admit steam to coil ten minutes before admitting outdoor air.
  - h. Close fresh air dampers if steam supply pressure falls below minimum specified.

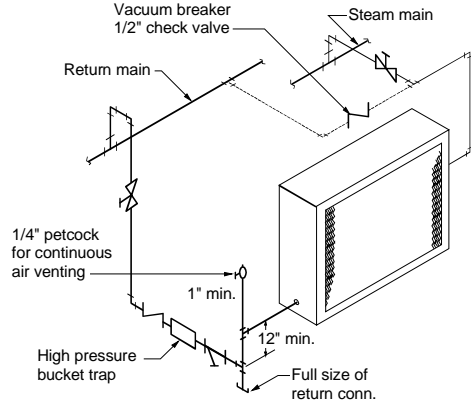
Figure 22. Piping arrangements



**High pressure (over 25 psi)**

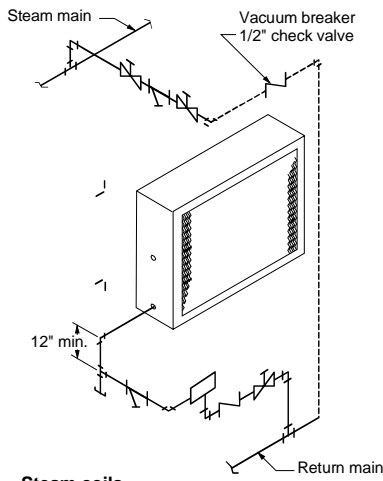


**Steam – same end coils.** Note that the addition of a vacuum breaker to permit the coil to drain during shutdown.

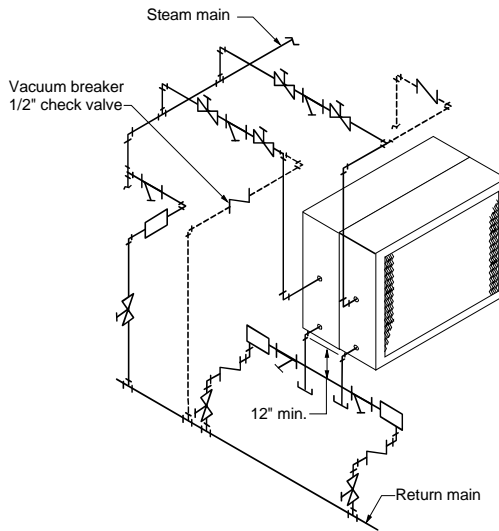


**Steam – opposite end coils.** Condensate is lifted to overhead return main

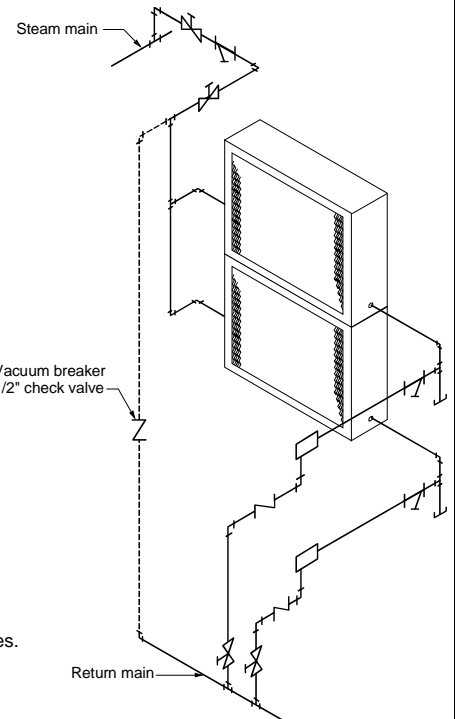
**Low pressure (to 25 psi)**



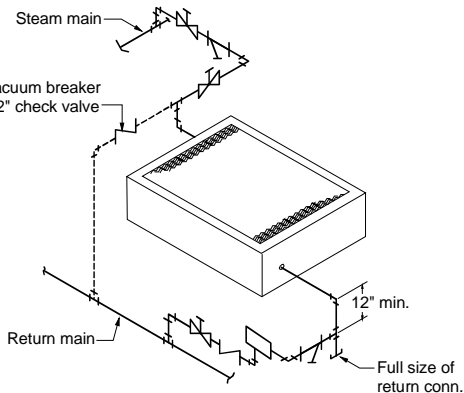
**Steam coils.**



**Steam – same end coil.** Installed in series. Note that each coil must have a separate control valve and trap.



**Steam coils.** Banked two high, individual trapping of each coil as shown is preferred.



**Steam – opposite end coils.** Installed

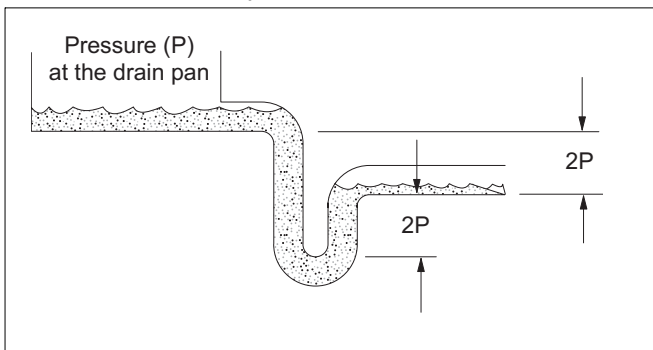
## Water heating coils

1. Water supply and water return connections extend through the end panel of the coil section. All connections are labeled on the end panel.
2. Water supply and water return connections are male N.P.T. iron pipe.
3. When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between coil connection and header.
4. Follow recommendations of the control manufacturer regarding types, sizes, and installation of controls.
5. Hot water coils are not recommended for use with entering air below 40°F.
6. If fresh air and return air are to be heated by a hot water coil, care should be used in the design of the system to provide thorough mixing before air enters the coil.
7. For preparation of coils for winter operation, see "Winterizing Water Coils" on page 23.

## Drain Pan Traps

Drain lines and traps should be run full size from the drain pan connection. Drain pans should have traps to permit the condensate from the coils to drain freely. On both blow-through and draw-through units, the trap depth and the distance between the trap outlet and the drain pan outlet should be twice the static pressure in the drain pan section under normal operation for the trap to remain sealed. See Figure 18.

Figure 18. Allow adequate distance between trap outlet and drain pan

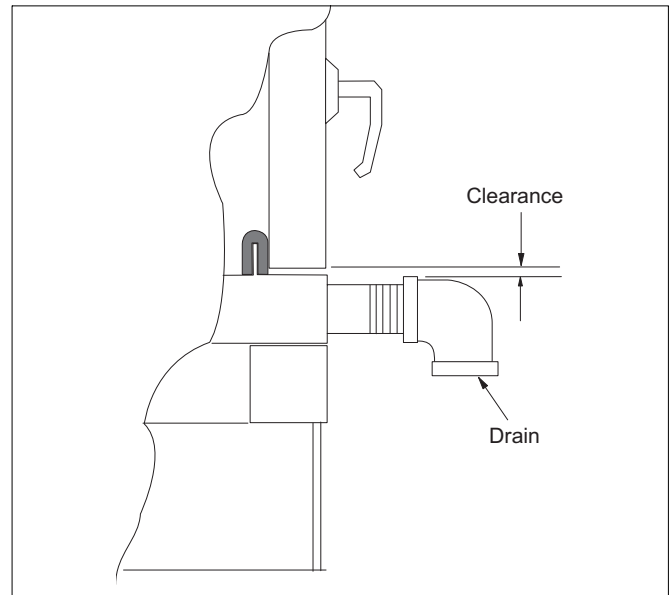


**Note:** The door panels on some applications have a close clearance over the drain pipes. Extend the drain fitting with a coupling if necessary for door clearance. See Figure 19.

**Note:** Outdoor drain traps should be made of a material that can withstand freezing temperatures.

**Note:** Drain traps that dry out can allow cold air to seep into the equipment.

Figure 19. Extend drain fitting for door clearance



## Internal Isolation Assembly Adjustment

On units with internally isolated fan and motor assemblies, the assemblies have been secured for shipment with a tie-down at each point of isolation.

### Before operating the unit:

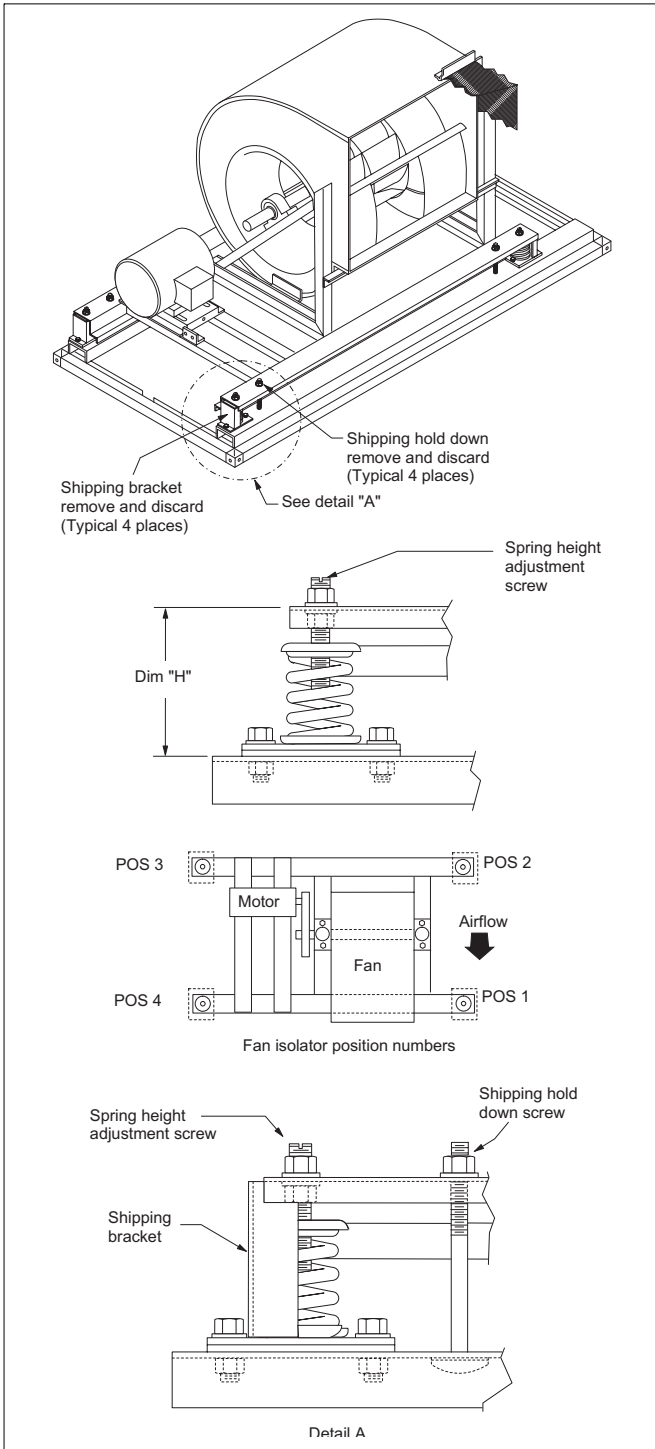
Remove the shipping brackets and tie-down bolts and discard. The shipping brackets located on the opposite drive side of the unit are difficult to access from the drive side of the unit. Either remove them before the unit is assembled, or remove the panel on the opposite drive side to gain access. See Figure 20.

The spring isolators under the four corners of the fan and motor assembly have been factory adjusted while the fan was not running. See Table 1. With the unit operating at normal cfm and static pressure, the isolators should all be at the same height opening. If adjustments are required, loosen the 1/2" capscrew on top of the isolator and turn the adjusting bolt to lower or raise the fan and motor base. Retighten the capscrew when adjustments are completed.

Table 1: Factory spring mount adjustments

SPRING MOUNT ADJUSTMENT AT REST			
Fan Discharge Position	Top or Bottom Horz. H	Downblast H	Upblast H
1	3.75	3.75	4.25
2	4.25	3.75	4.25
3	4.25	3.75	4.25
4	3.75	3.75	4.25

Figure 20. Removing shipping brackets

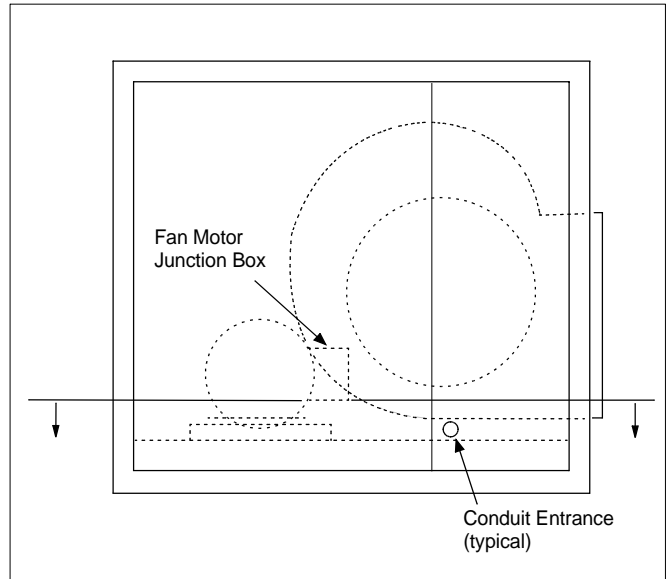


## Electrical Installation

1. Electrical service to the fan must correspond to the rated voltage on the motor nameplate and be in conformance with the National Electric Code and local restrictions.
2. The fan section metal frame must be connected to the building electrical ground.
3. A door electrical interlock is not provided as standard.
4. Thermal motor protection is external to the unit.

Electrical conduit entrances for units should be located above the bottom of the unit enough to clear components inside, but **MUST** be located below the bottom of the fan motor junction box. See Figure 21.

Figure 21. Electrical conduit location



### NOTICE

**The base section of each cabinet has a drip pan installed below every panel that drains to the outside frame trough. Any holes cut through the bottom of the unit must also penetrate the drip pan. If holes are cut in the drip pan, they must be sealed to prevent moisture leakage.**

# Operation Guidelines

## Startup Checks

When performing startup and service, thorough safety precautions must always be taken. These functions must be performed by trained, experienced personnel.

### WARNING

#### ROTATING FAN

Can cause severe injury or death. Before servicing fans, lockout and tag out power.

### AVERTISSEMENT

#### PIÈCES MOBILES DANGEREUSES.

Avant de réparer ou entretenir les ventilateurs, coupez l'alimentation électrique de cet appareil et bloquez le commutateur à OFF.

### WARNING

#### FIRE/ELECTRIC SHOCK HAZARD.

Can cause property damage, personal injury or death. Fan power supply must be wired and motor frame grounded in accordance with local electric codes.

### AVERTISSEMENT

Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort. L'alimentation électrique du moteur du ventilateur de même que la mise à la terre du châssis du moteur doivent être faits conformément aux codes d'installations électriques en vigueur.

### WARNING

#### FAN MOTOR REQUIRES OVERLOAD PROTECTION.

Failure to provide motor overload protection can result in fire, property damage, electric shock, personal injury or death. Connect motor to an overload protective device rated in compliance with local electric codes.

### AVERTISSEMENT

Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort. Connecter au moteur du ventilateur électrique un dispositif de protection contre les surcharges conforme aux codes d'installations électriques en vigueur.

### CAUTION

#### DO NOT OVERHEAT FAN MOTOR

High air temperatures in the fan section can cause the fan motor to burnout. On draw-through air handlers or air handlers with the fan section down the air stream from the heating section, the discharge air temperature of the heating section must not exceed 104°F (40°C).

### ATTENTION

Risques de dommages dans le moteur du ventilateur électrique. Si la température de l'air à proximité du ventilateur est élevée, le moteur du ventilateur électrique peut chauffer et brûler. Sur les transmetteurs d'air à circulation transversale ou les transmetteurs dont le ventilateur est en aval de l'unité de chauffage, régler la température de l'air sortant de l'unité de chauffage à 40°C (104°F).

#### Before starting up the unit

Before entering fan section, make sure that fan electrical power source is disconnected and locked in the "OFF" position.

1. Check that the unit is completely and properly installed with ductwork connected. Check that all construction debris is removed and filters are clean.
2. Check that all electrical work is complete and properly terminated. Check that all electrical connections are tight and that the proper voltage is connected. Phase imbalance must not exceed 2%.
3. Ball bearings on fan shaft and motor are prelubricated and do not need grease before startup.
4. Check tightness of setscrews in bearings and fan wheel(s). If retightening is needed, make certain the fan wheel(s) are positioned per *Table 2 or Table 3 on page 14* and setscrews are torqued per *Table 6 on page 15*.  
**CAUTION: Equipment damage due to loose fasteners represents improper start-up and equipment abuse. It is not covered by the warranty.**
5. Check alignment of fan and motor sheaves and belt tension. Adjust if necessary. Check tightness of sheave setscrews and/or capscrews. *See Figure 28 and Figure 29 on page 21.*
6. Leak test thermal system to verify that connections are tight.
7. Check that condensate drain is trapped.
8. Rotate shaft by hand to be sure it is free.
9. Fan startup: Fan should start and run. Observe the rotation. If the fan is operating backward, reverse two legs of the 3-phase supply power.

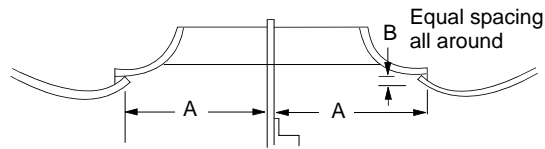
**Note:** Variable pitch fan drives are usually provided for operation in the mid-speed adjustment range. However, the drives are usually shipped with the adjustment opened up for minimum fan speed. The drives should be adjusted for the proper airflow. *See "Fan Drive Adjustments" on page 18.*

#### After first 48 hours of operation

1. Disconnect and lock electrical power source. Check tightness of all bearing, wheel, and sheave setscrews (or capscrews). *See Table 6*
2. Recheck belt tension and adjust if necessary. Belts tensioned sufficiently to slip one to two seconds at startup will perform satisfactorily, extending life and reducing vibration. If retensioning is necessary, be certain sheave alignment is retained.

# Fan Wheel Alignment

Table 2: Wheel-to-inlet funnel relationship —  
airfoil type fan wheels (housed)

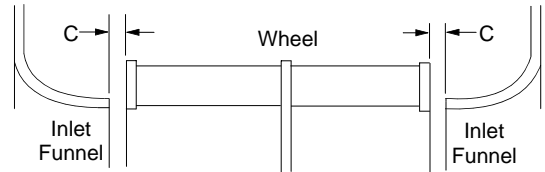


AIRFOIL				
Unit Sizes 015-290				
Diameter	A (inches)	A (mm)	B (inches)	B (mm)
13.22	4.56	116	0.21	5.33
14.56	5.06	129	0.21	5.33
16.18	5.62	143	0.21	5.33
17.69	6.90	175	0.22	5.59
21.56	7.59	193	0.24	6.10
24.00	8.45	215	0.23	5.84

Notes:

1. Dimensional relationship must be held to obtain rated air performance.
2. Dimension A is achieved by loosening setscrews in wheel hub(s), shifting wheel(s) axially as needed, and retightening setscrews.
3. Dimension B is obtained by loosening screw and washer fasteners around periphery of funnel(s), shifting funnel radially as required, and re-torquing fasteners.

Table 3: Wheel-to-inlet funnel relationship —  
forward curved type fan wheels (housed)



FORWARD CURVED		
Unit Sizes 015-290		
Diameter (Inches)	C (inches)	C (mm)
9 x 4	0.25	6.35
9 x 7	0.13	3.30
9 x 9	0.25	6.35
10	0.22	5.59
12	0.35	8.89
15	0.44	11.18
18	0.25	6.35
20 (class 1 & 2)	0.73	18.54
22-1/2 (class 1 & 2)	0.59	14.99
24-1/2 (class 1 & 2)	0.56	14.22

Notes:

1. Dimensional relationship must be held to obtain rated air performance.
2. Adjust dimension C by loosening wheel hub setscrews, shifting wheel(s) axially as needed, and retightening setscrews.

Table 4: Wheel-to-inlet funnel relationship - plenum fans

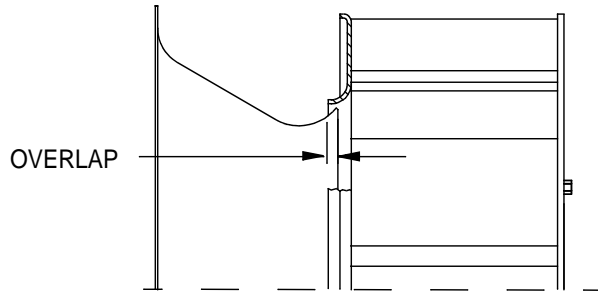
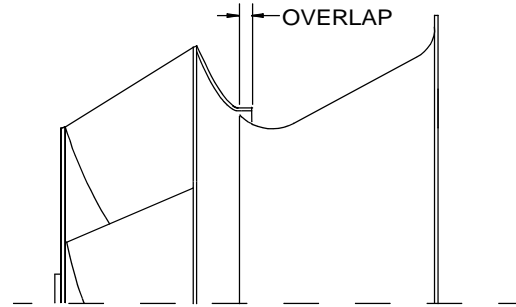


Table 5: Wheel-to-inlet funnel relationship - inline fans



WHEEL — FUNNEL OVERLAP	
SIZE	OVERLAP
13	.120
15	.190
16.5	.250
18.25	.310
20	.380
22.25	.440
24.5	.500
27	.560
30	.620
33	.750
36.5	.810
40.25	.880

WHEEL — FUNNEL OVERLAP	
SIZE	OVERLAP
150	.375
165	.438
182	.562
200	.625
222	.688
245	.750
270	.812
300	.875

Table 6: Bearing collar and wheel hub setscrew torque

SETSCREW Diameter (inches)	MINIMUM TORQUE	
	ft. / lbs.	kg. / M.
1/4	5.5	.76
1/16	10.5	1.45
3/8	19.0	2.63
7/16	29.0	4.01
1/2	42.0	5.81
5/8	92.0	12.72

# Fan Operating Limits

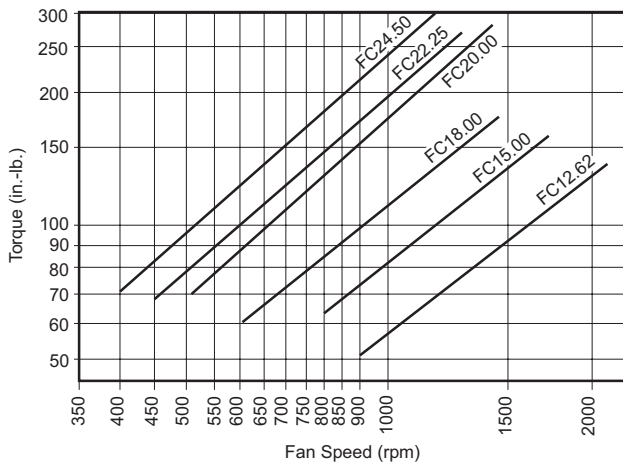
Do not exceed the operating limits in *Table 7*. A fan wheel that is operated beyond the rpm limits shown may suffer permanent

distortion or fracture. The resulting unbalance may cause severe unit vibration.

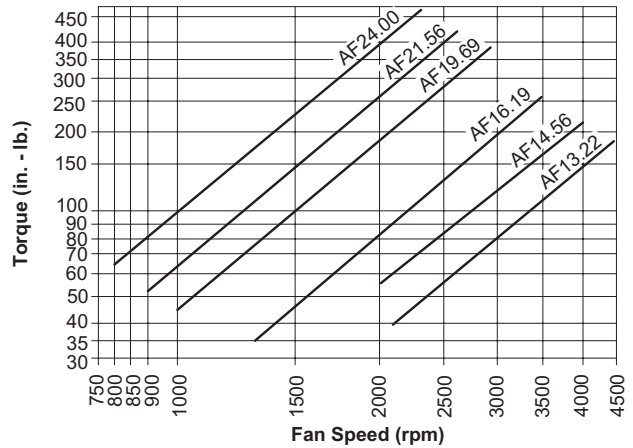
*Table 7: Operating limits - housed fans*

FAN OPERATING LIMITS										
<b>Forward curved — Housed</b>										
Diameter	9 x 4	9 x 7	9 x 9	10.62	12.62	15	18	20	22.25	24.50
Maximum RPM Class I	N/A	2189	2223	1934	1614	1328	1155	1050	944	858
Maximum RPM Class II	2244	2854	2896	2518	2091	1725	1450	1200	1030	910
<b>Airfoil — Housed</b>										
Diameter	13.22	14.56	16.19	19.69	21.56	24.00				
Maximum RPM Class I	3000	3000	2300	2000	1700	1500				
Maximum RPM Class II	4335	3918	3457	2858	2547	2255				

*Figure 22. Torque for FC variable inlet vanes (in. - lb.)*



*Figure 23. Torque for AF variable inlet vanes (in. - lb.)*



*Table 8: Operating limits — plenum fans*

FAN OPERATING LIMITS												
Diameter	13.5	15	16.5	18.25	20	22.25	24.5	27	30	33	36.5	40.25
Maximum RPM Class I	2895	2589	2376	2256	2077	1875	1691	1479	1328	1209	1073	972
Maximum RPM Class II	3786	3384	3100	2959	2703	2413	2199	1928	1730	1579	1401	1264
Maximum RPM Class III	4000	4000	3887	3735	3409	3065	2780	2423	2182	1984	1756	1598



Figure 24. Torque requirements at 100% WOV for SWSI plenum fans with NESTED inlet vane

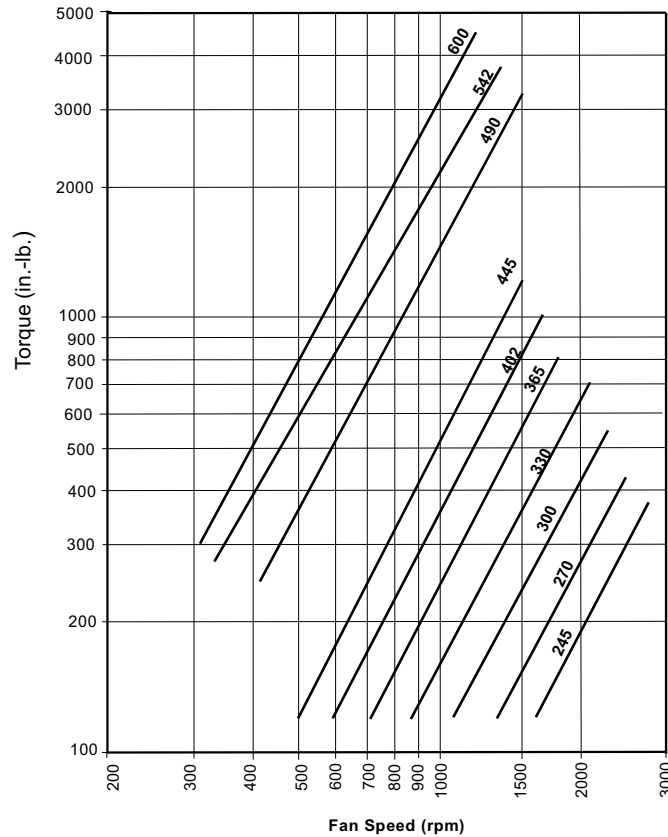


Table 9: Operating limits — inline fans, twin fans

FAN OPERATING LIMITS								
<b>Inline Fans</b>								
Diameter	150	165	182	200	222	245	270	300
Maximum RPM Class I	2727	2488	2236	2041	1835	1665	1476	1330
Maximum RPM Class II	3409	3111	2796	2551	2294	2082	1846	1662
<b>Twin Fans</b>								
Diameter	9.5	10.62	12.62	15	18.12	20		
Maximum RPM	2400	2000	1600	1400	1200	1000		
Maximum HP	10	15	15	30	40	40		

## Fan Vibration Levels

Each unit as shipped has been trim-balanced to operate smoothly. If excessive vibration occurs after installation, use the accepted industry guidelines for field balancing fans. See Table 10.

Table 10: Vibration levels

FAN SPEED (RPM)	VIBRATION
800 or less	5 mills maximum displacement
801 or greater	0.20 in./sec. maximum velocity

**Note:** Excessive vibration from any cause contributes to premature fan and motor bearing failure. Overall vibration levels should be monitored every six months of operation. An increase in levels is an indication of potential trouble.

## Vibration causes

1. Wheel imbalance.
  - a. Dirt or debris on wheel blades.
  - b. Loose setscrews in wheel hub or bearing-to-shaft.
  - c. Wheel distorted from overspeed.
2. Bent shaft.
3. Drive faulty.
  - a. Variable pitch sheaves - Axial and radial runout of flanges; uneven groove spacing; out of balance. Also similar faults in driven sheave.
  - b. Bad V-belts; lumpy, or mismatched; belt tension too tight or too loose.
4. Bad bearings, loose bearing hold-down bolts.
5. Motor imbalance.
6. Fan section not supported evenly on foundation.

# Service and Maintenance

## Periodic Service and Maintenance

1. Check all moving parts for wear every six months.
2. Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness every six months.

## Ball Bearing Lubrication

1. Motor bearings - All ball bearings are prelubricated and do not require addition of grease at time of installation. However, periodic cleaning out and renewal of grease is necessary. Please note that extreme care must be exercised to prevent foreign matter from entering the bearing. It is also important to avoid over-greasing. Only a high grade, clean mineral grease having the following characteristics should be used.
  - a. Melting point preferably over 302°F (150°C), freedom from separation of oil and soap under operating and storage conditions; and freedom from abrasive matter, acid, alkali and moisture.
  - b. Specific greasing instructions are located on a label attached to the fan section door.
2. Fan shaft bearings - All ball bearings are prelubricated and do not require addition of grease at time of installation. However, periodic renewal of grease is necessary. Bearings are accessible through access door in fan section. Grease fittings are located in front of door opening on drive end of blower section. Apply grease slowly until a very slight bleeding of grease from the seals is noted. Tie hinged door(s) open. **Do not over-lubricate.** Wipe off any excess grease to prevent overheating.

The lubrication interval varies with the period of operation and temperature of the ambient air. Follow instructions listed below:

	Bearing Operating Temp Range		
	to 130°F (54°C)	to 150°F (66°C)	over 150°F (66°C)
Cont. Operation:	6 months	4 months	2 months
12-Hr. Day Operation:	12 months	12 months	6 months

Table 11: Lubricants recommended for fan shaft ball bearings

MANUFACTURER	PRODUCT NAME	TEMP. RANGE	
		°F	°C
Texaco Lubricants Company	Premium RB	-30 to 300	-34 to 149
Keystone Ind. Lubricants	81EP-2	0 to 250	-18 to 121
Mobil Oil Corporation	Mobilith SCH100	-40 to 350	-40 to 177
Chevron U.S.A. Inc.	SRI-2	-20 to 325	-29 to 163
Exxon Company, U.S.A.	Ronex MP	-40 to 300	-40 to 149
Shell Oil Company	Alvania No. 2	-20 to 240	-29 to 116

Note: Temperature ranges over 225°F are shown for lubricants only. High temperature applications are not suitable for standard air handler components.

## Fan Drive Adjustments

**WARNING**

**ROTATING FAN**  
 Can cause severe injury or death. Before servicing fans, lockout and tag out power.

**AVERTISSEMENT**

**PIÈCES MOBILES DANGEREUSES.**  
 Avant de réparer ou entretenir les ventilateurs, coupez l'alimentation électrique de cet appareil et bloquez le commutateur à OFF.

**WARNING**

**MOVING PARTS**  
 Do not open the hinged access door and screw-fastened access panels while the unit is operating. Moving parts and strong suction forces can cause severe personal injury or death.

**BEFORE ENTERING ANY FAN SECTION, MAKE SURE THE ELECTRICAL POWER SOURCE TO THE FAN MOTOR IS DISCONNECTED, LOCKED OUT AND TAGGED OUT.**

Do not enter the fan section while the unit is operating to determine fan speed.

Upon completion of the air balance, it is recommended that the variable pitched motor sheave be replaced with a properly sized fixed sheave. Initially, it is best to have a variable pitched motor sheave for the purpose of air balancing, but fixed sheaves maintain balancing and alignment more effectively and provide longer belt and bearing life and vibration free operation.

With the electrical power disconnected, locked and tagged out, measure the diameter of the V-belt outer surface where it passes around the sheave (pitch diameter). Calculate fan speed from the motor nameplate rpm.

$$\text{Fan rpm} = \text{Motor rpm} \times \frac{\text{Measured Diameter at Motor Sheave}}{\text{Measured Diameter at Fan Sheave}}$$

## "VM" and "VP" Variable Pitch Key Type Sheaves

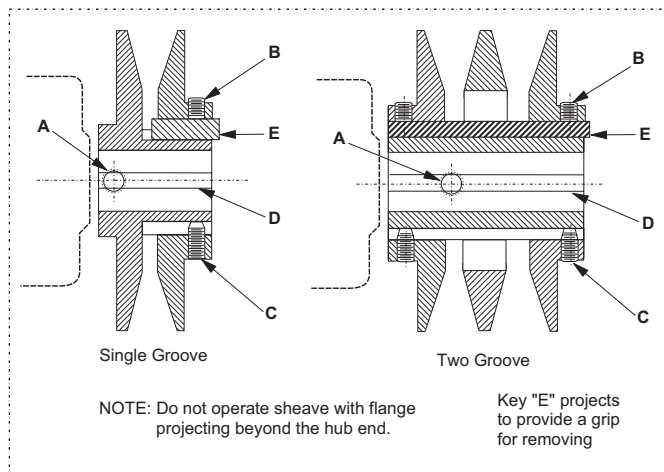
### Mounting:

1. All sheaves should be mounted on the motor or driving shaft with the setscrews "A" toward the motor.
2. Verify that both driving and driven sheaves are in alignment and that shafts are parallel.
3. Fit internal key "D" between sheave and shaft, and lock setscrew "A" securely in place.

### Adjusting:

1. Loosen setscrews "B" and "C" in moving parts of sheave and pull out external key "E". (This key projects a small amount to provide a grip for removing.)
2. Adjust sheave pitch diameter for desired speed by opening moving parts by half or full turns from closed position. **Do not open more than five full turns for "A" belts or six full turns for "B" belts.**
3. Replace external key "E" and securely tighten setscrews "B" over key and setscrews "C" into keyway in fixed half of the sheave.
4. Put on belts and adjust belt tension. **Do not force belts over grooves** (see "Drive Belt Adjustment" on page 21).
5. Future adjustments should be made by loosening the belt tension and increasing or decreasing the pitch diameter of the sheave by half or full turns as required. Readjust belt tension before starting drive.
6. Two-groove sheaves must have both halves adjusted by the same number of turns from closed position to provide the same pitch diameter.
7. Verify that all keys are in place and that all setscrews are tight before starting drive. Check setscrews and belt tension after 24 hours service.

Figure 25. "VP" type sheave adjustment



### "LVP" Variable Speed Sheaves

#### Mounting:

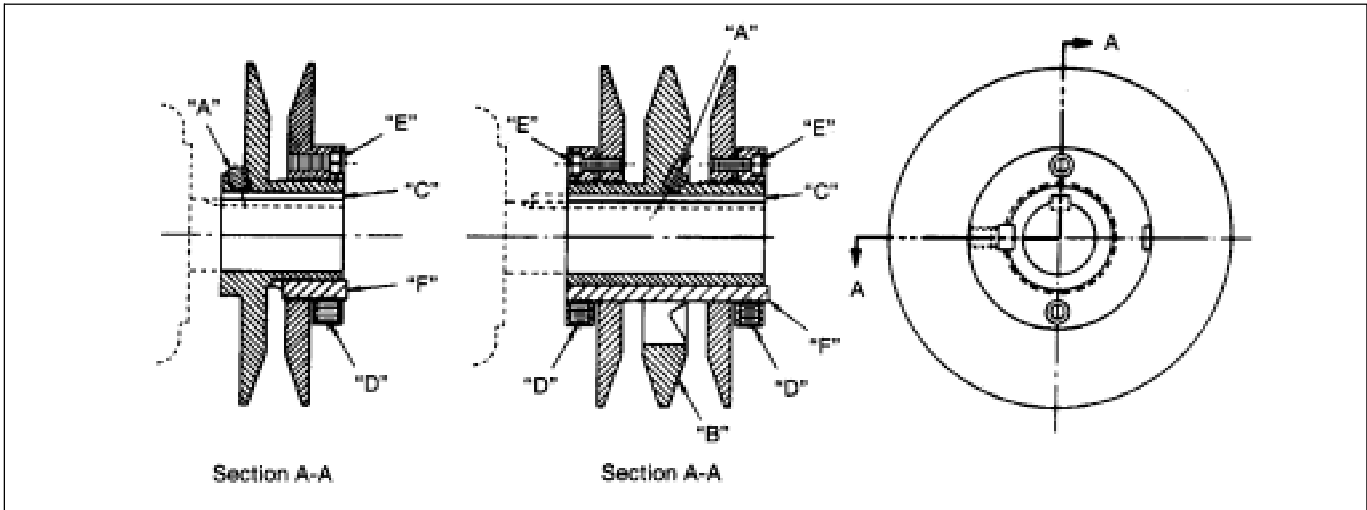
1. Slide sheave on motor shaft so that the side of the sheave with setscrew "A" is next to the motor, when setscrew "A" is in the hub or barrel of the sheave.
2. When setscrew "A" is at an angle in the center flange "B", it should be mounted away from the motor so that the outer locking ring and flange can be removed to get to the setscrew.
3. To remove the flange and locking ring:
  - a. Loosen setscrews "D".
  - b. Loosen but **do not remove** capscrews "E".

- c. Remove key "F". **Note:** This key projects a small amount to provide a grip for removing.
  - d. Rotate the flange counterclockwise until it disengages the threads on the sheave barrel.
4. Verify that the driving and driven sheaves are in alignment and the shafts are parallel. When aligning two-groove sheaves, allow room between the sheave and motor to get to capscrews "E".
  5. Insert key "C" between the sheave and the shaft and tighten setscrew "A" securely.
  6. If flange and locking ring have been removed, when replacing them make sure that the inner and outer flanges are open from the closed position by the same amount as the other flange. This can be determined by accurately measuring the top width of the grooves.
  7. Insert key "F".
  8. Tighten setscrews "D" and capscrews "E".
  9. Put on belts and adjust belt tension. **Do not force belts over grooves** (see "Drive Belt Adjustment" on page 21).
  10. Be sure that all keys are in place and all setscrews and all capscrews are tight before starting the drive. Check and retighten all screws and retension belts after approximately 24 hours of service.

#### Adjusting:

1. Slack off belt tension if belts have been installed.
2. Loosen setscrews "D".
3. Loosen but **do not remove** capscrews "E".
4. Remove key "F". **Note:** This key projects a small amount to provide a grip for removing.
5. Adjust pitch diameter by opening or closing the movable flanges by half or full turns. **Note:** Two-groove sheaves are supplied with both grooves set at the same pitch diameter. **Both movable flanges must be moved the same number of turns to provide the same pitch diameter for satisfactory operation. Do not open sheaves more than five turns for "A" belts or six turns for "B" belts.**
6. Replace key "F".
7. Tighten setscrews "D" and capscrews "E".
8. If belts have been installed, readjust belt tension. If belts have not been installed, install them and adjust belt tension. **Do not force belts over grooves** (see "Drive Belt Adjustment" on page 21).
9. Verify that all keys are in place and all setscrews and all capscrews are tight before starting the drive. Check and retighten all screws and retension belts after approximately 24 hours of operation.

Figure 26. "LVP" type sheave adjustment



### "MVP" Variable Speed Sheaves

#### Mounting:

1. Verify both driving and driven sheaves are in alignment and the shafts are parallel. The centerline of the driving sheave must be in line with the centerline of the driven sheave. See Figure 27.
2. Verify that all setscrews are torqued to the values shown in Table 12 before starting drive. Check setscrew torque and belt tension after 24 hours of service.

#### Adjusting:

1. Adjust motor base forward to release belt tension. Remove the belts for easier adjustment.
2. Loosen, but do not remove both of the locking setscrews "A" in the outer locking ring by using a hex key or torque wrench with a hex bit.
3. Adjust sheave to desired pitch diameter by turning the outer locking ring. Use a spanner wrench or drift inserted into the 3 holes that are located 120° apart on the ring.
4. Any pitch diameter can be obtained within the sheave range. One complete turn of the outer locking ring will change the pitch diameter 0.233".
5. Do not open sheaves more than the following
  - Do not open "B" sheaves more than 4-3/4 turns for the "A" belts or 6 turns for the "B" belts.
  - Do not open "C" sheaves more than 9-1/2 turns.
  - Do not open "5V" sheaves more than 6 turns.
  - Do not open "8V" sheaves more than 8 turns.
6. Tighten BOTH locking screws "A" in the outer locking ring before operating the drive. Use a torque wrench and tighten to the value shown in Table 12.
7. Replace belts and adjust the motor base to tension the belts properly. See Figure 29.
8. Do not loosen any screws other than the two locking screws "A" in the outer locking ring when adjusting the

sheave pitch. Do not operate the drive until the locking screws have been set to the torque specifications.

Table 12: Screw torque values

Nominal Screw Size (Dia-Thds/In.)	Socket Head Cap Screws		Flat Head Socket Screws	Hollow Head Set Screws Only			
	Seating Torque		Seating Torque	Lengths equal or greater than Dia.		For Lengths (L) less than Dia.	
	(in.-lbs.)	(ft.-lbs.)	(in.-lbs.)	Seating Torque (in.-lbs.)	Seating Torque (ft.-lbs.)	Length (L) (in.)	Seating Torque (in.-lbs.)
1/4-20NC	150	12.5	100	87	7.3	3/16	50
5/16-11NC	305	25.4	200	165	13.8	1/4	90
3/8-16NC	545	45.4	350	290	24.2	1/4,5/16	150,250
1/2-13NC	1300	108.3	N/A	620	51.7	N/A	N/A
5/8-11NC	N/A	N/A	N/A	1225	102.1	N/A	N/A

Figure 27. Sheave adjustment

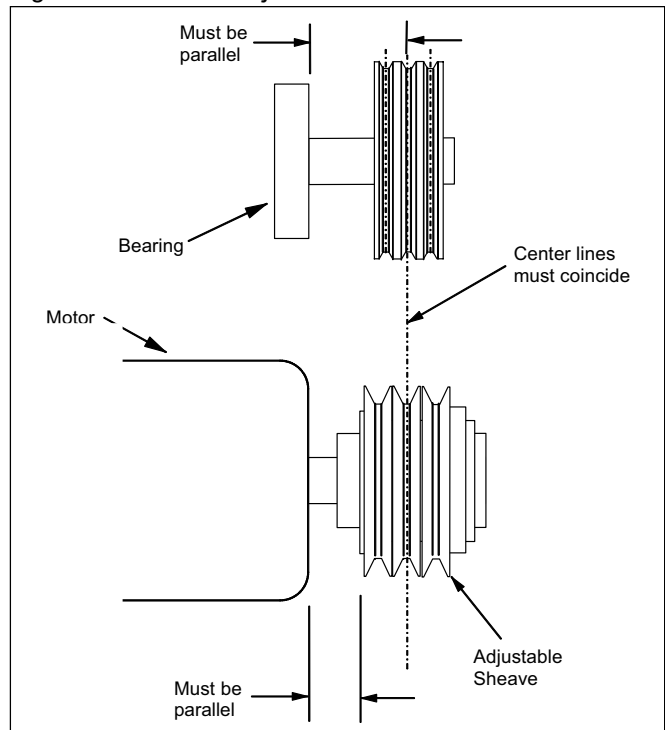
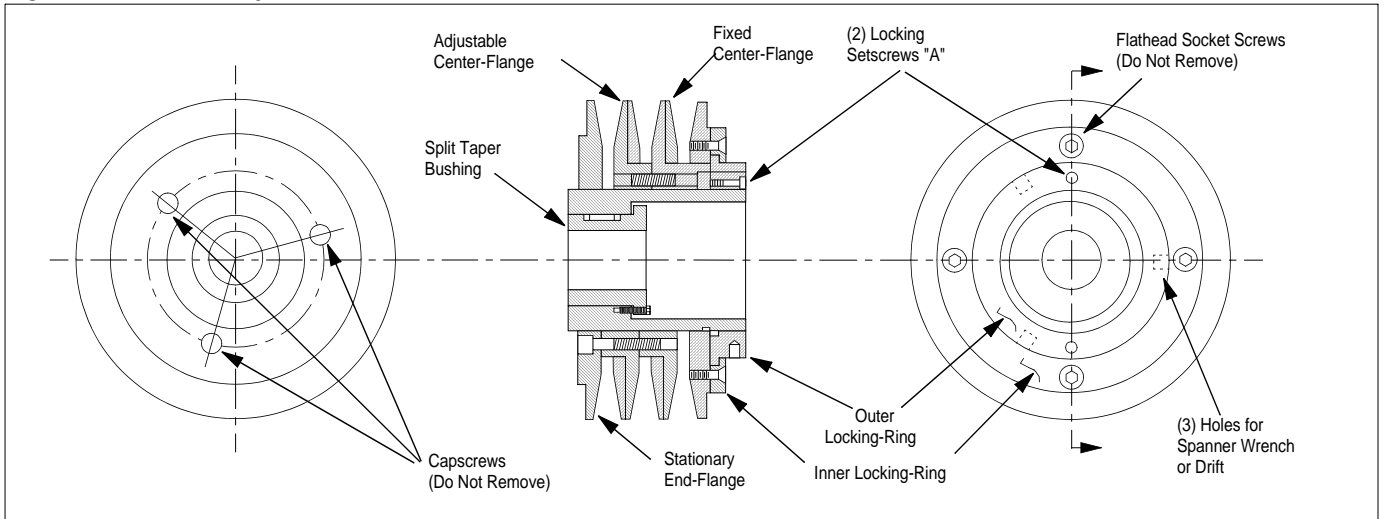


Figure 28. Sheave adjustment



## Drive Belt Adjustment

### General Rules of Tensioning

1. The ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24-48 hours of operation.
3. Over tensioning shortens belt and bearing life.
4. Keep belts free from foreign material which may cause slippage.
5. Make V-drive inspection on a periodic basis. Adjust tension if the belt is slipping. Do not apply belt dressing. This may damage the belt and cause early failure.

### Tension Measurement Procedure

1. Measure the belt span. See Figure 29.
2. Place belt tension checker squarely on one belt at the center of the belt span. Apply force to the checker, perpendicular to the belt span, until the belt deflection equals belt span distance divided by 64. Determine force applied while in this position.
3. Compare this force to the values in Table 13.

Figure 29. Drive belt adjustment

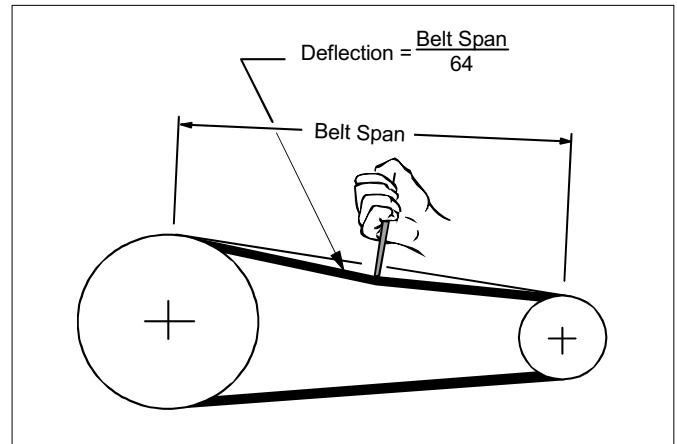


Table 13: Belt deflection force

CROSS SECTION	SHEAVE DIAMETER (INCHES)		DEFLECTION FORCE (LBS.)			
	SMALLEST SHEAVE DIAMETER RANGE	RPM RANGE	BELT DEFLECTION FORCE			
			CROSS SECTION A, B, 5V		CROSS SECTION AX, BX, 5VX	
			USED BELT	NEW BELT	USED BELT	NEW BELT
A, AX	3.0-3.6	1000-2500	3.7	5.5	4.1	6.1
		2501-4000	2.8	4.2	3.4	5.0
	3.8-4.8	1000-2500	4.5	6.8	5.0	7.4
		2501-4000	3.8	5.7	4.3	6.4
	5.0-7.0	1000-2500	5.4	8.0	5.7	9.4
		2501-4000	4.7	7.0	5.1	7.6
B, BX	3.4-4.2	850-2500			4.9	7.2
		2501-4000			4.2	6.2
	4.4-5.6	860-2500	5.3	7.9	7.1	10.5
		2501-4000	4.5	6.7	7.1	9.1
	5.8-8.6	860-2500	6.3	9.4	8.5	12.6
		2501-4000	6.0	8.9	7.3	10.9
5V, 5VX	4.4-6.7	500-1749			10.2	15.2
		1750-3000			8.8	13.2
		3001-4000			5.6	8.5
	7.1-10.9	500-1740	12.7	18.9	14.8	22.1
		1741-3000	11.2	16.7	13.7	20.1
	11.8-16.0	500-1740	15.5	23.4	17.1	25.5
1741-3000		14.6	21.8	16.8	25.0	

## Front Load Filter Option

Front loaded filter options require that the filters be removed and replaced from inside the unit.

### WARNING

**Moving belt and fan can cause severe personal injury or death. During installation and filter maintenance:**

1. Verify that the belt and fan guards on plenum fan units are always in place.
2. Lock and tag out fans to prevent accidental start up.
3. Do not enter the filter compartment until the fan is completely stopped.
4. Use approved equipment for reaching filters located above normal reach. Do not step on filter frames or unit components.
5. Floor surfaces must be dry and free of oil or grease.

### AVERTISSEMENT

**Pendant l'installation et où l'entretien des filtres, une courroie en mouvement ou un ventilateur en opération peuvent causer des blessures graves où même causer la mort.**

1. S'assurer que les gardes de courroie et de ventilateur sont toujours en place.
2. Verrouiller les démarreurs des ventilateurs et afficher un avis de mise-en-garde afin de prévenir tout accident ou démarrage.
3. Attendre que le ventilateur soit complètement arrêté avant d'entrer dans l'unité.
4. Utiliser seulement des équipements approuvé pour joindre les bancs de filtres; ne pas mettre soit sur les cadres des filtres ou même sur toutes composantes de l'unité.
5. La surface des planchers doit être sec et libre de toute trace d'huile et où de graisse.

To remove filters, rotate the wire clips. This will release both the pre-filter and the final filter. When installing clean filters, check to verify the filters are fully seated in the frame. See Figure 30.

Figure 30. Frame and filters with holding clips

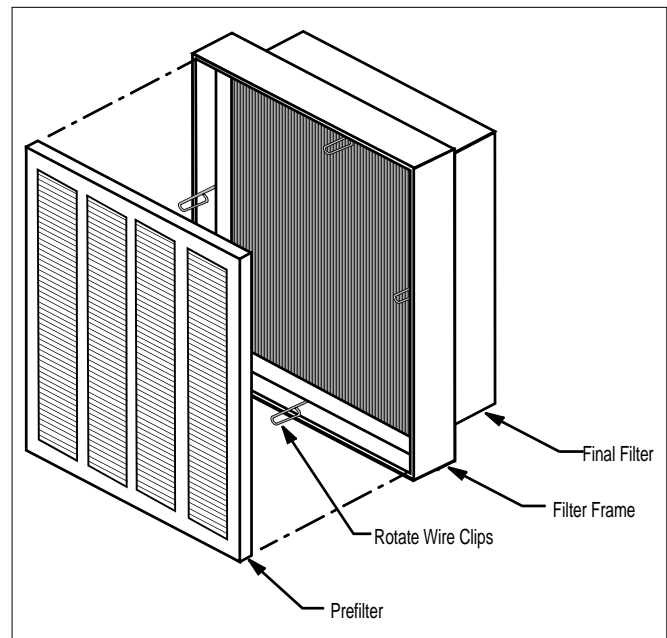


Table 14 shows the typical filter pressure drop for clean filters at rated air flow and a final pressure drop for front loaded filters.

Table 14: Filter pressure drops

*Bag filters - DriPak 2000*

Efficiency	45%	65%	85%	95%
Rated Velocity (FPM)	625	500	500	500
Initial Pressure Drop	.20 -.26	.21 -.30	.34 -.48	.50 -.70
Final Pressure Drop	1.0	1.0	1.0	1.0

*Cartridge filters - Varicel II MH - 4.25" deep*

Efficiency	65%	85%	95%
Rated Velocity (FPM)	500	500	500
Initial Pressure Drop	.43	.61	.70
Final Pressure Drop	1.5	1.5	1.5

*Cartridge filters - Varicel SH - 12" deep*

Efficiency	70%	80%	95%
Rated Velocity (FPM)	500	500	500
Initial Pressure Drop	.39	.56	.58
Final Pressure Drop	1.2	1.2	1.2

*Pleated flat panel filters*

Type	Perfect Pleat	AMAir 300 4"
Efficiency	30%	30%
Rated Velocity (FPM)	500	625
Initial Pressure Drop	.36	.36
Final Pressure Drop	1.0	1.0

*5700 filters*

Efficiency	N/A
Rated Velocity (FPM)	500
Initial Pressure Drop	.25
Final Pressure Drop	1.0

*Pleated 62-Plus filters*

Size	2"	4"
Efficiency	70%	70%
Initial Pressure Drop	.42	.37
Final Pressure Drop	1.0	1.0

## Winterizing Water Coils

Coil freeze-up can be caused by such things as air stratification and failure of outdoor dampers and/or preheat coils. Routine draining of water cooling coils for winter shutdown cannot be depended upon as insurance against freeze-up. Severe coil damage may result. It is recommended that all coils be drained as thoroughly as possible and then treated in the following manner.

Fill each coil independently with an antifreeze solution using a small circulating pump and again thoroughly drain.

Check freezing point of antifreeze before proceeding to next coil. Due to a small amount of water always remaining in each coil, there will be a diluting effect. The small amount of antifreeze solution remaining in the coil must always be concentrated enough to prevent freeze-up.

Note: Carefully read instructions for mixing antifreeze solution used. Some products will have a higher freezing point in their natural state than when mixed with water.

## Coil Maintenance

1. The coil must be clean to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Use a chemical coil cleaner on multiple row coils. Read and follow the chemical cleaner's instructions as some cleaners may contain harsh chemicals. Take care not to damage fins while cleaning. **Caution: Fin edges are sharp.**
2. Drain pans in any air conditioning unit may have some moisture. Algae, etc., will grow due to airborne spores and bacteria. Periodic cleaning is necessary to prevent this build-up from plugging the drain and causing the drain pan to overflow. Also, the drain pans should be kept clean to prevent the spread of disease. Cleaning should be performed by qualified personnel.

 **WARNING**

**CLEAN DRAIN PAN REGULARLY SO MOLD DOES NOT DEVELOP.**

 **AVERTISSEMENT**

**Pour éviter la moisissure Nettoyer régulièrement le bassin de recuperage.**

3. Dirt and lint can clog the condensate drain, especially with dirty filters. Inspect the drain twice a year to help avoid overflow.

## Component Removal & Replacement

See “Access Doors and Panels” on page 6 for instructions on removing panels and opening fan access doors to remove or replace components.

### Fan Section

The fan shaft, motor, and any drive components can be removed and replaced through the access door opening. If required, the side panel can be removed for additional access.

If fan replacement is required, the entire fan assembly can be pulled out the side of the cabinet. The fan assembly includes the fan housing, the bearing support, and the fan base.

To remove the fan assembly, remove the side panels and any intermediate supports (follow instructions for side panel removal). Once the panels and any intermediate supports are removed, disconnect the neoprene bulk head seal that is attached to the fan discharge. Remove the four discharge angles that hold the neoprene canvas in place around the discharge opening. Then disconnect the fan sled from each of the corner mounts and pull the entire assembly out the side of the unit. After the fan sled is out, loosen the fan bearings and pull out the shaft. Disconnect the fan housing from the fan sled, and bearing support by removing the attaching bolts.

Replace the new fan, re-connect the shaft and bearings and put the fan assembly in the cabinet. Replace panels and fasteners.

### Coil Removal and Replacement

#### Removing Single coils

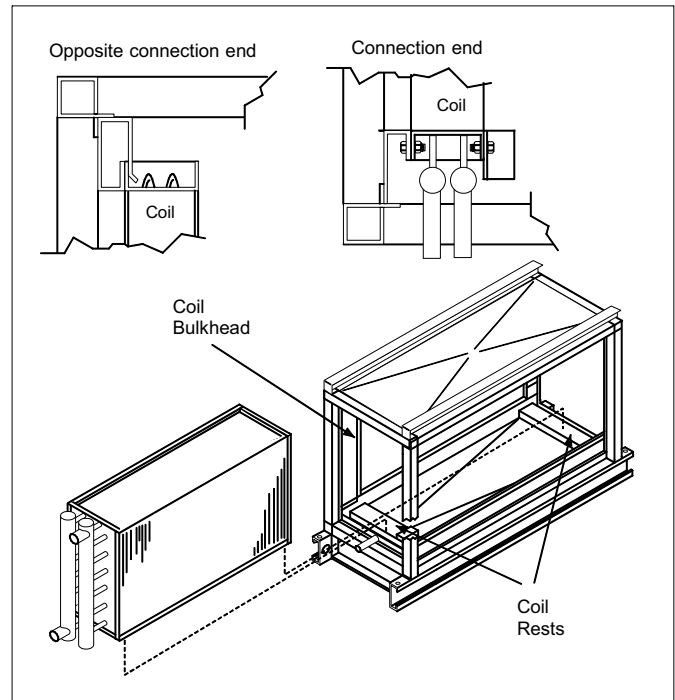
**Note:** Single coils are bolted to the unit on the connection end. The connection end is held in place with a clamp. See Figure 31.

1. Disconnect all piping and remove the brass plugs for the vents and drains located in the connections. Remove all screws and remove the access panel.
2. Remove the screws holding the coil in place then lift and pull the coil out the side.

#### Installing Single Coils

1. Slide the coil through the opening in the coil section onto the bottom coil rests. Coils must be placed up against the coil bulkheads to prevent any air bypass around the coil. Once the coil is in place, fasten coil to the section. Caulk the seams between the coil casings and bulkheads. See Figure 31.
2. If this is an additional coil being installed and not a replacement, you must locate the coil supply and return connections dimensionally. Carefully drill holes in the end panels of the unit.
3. Remove the brass plugs for the vents and drains on the connections. Slip the panel over the connections. Replace the brass plugs and panel fasteners.

Figure 31. Single coil installation / removal



#### Removing Stacked Coils

**Note:** Top and bottom stacked coils are held together with steel plate and screws on one side and drain trough and screws on the other side. Remove the plate and trough before removing the coils. The coils cannot be removed attached together. See Figure 32.

1. Disconnect all piping and remove the brass plugs for the vents and drains located in the connections. Remove all screws and remove the access panel.
2. Remove the bolts holding the coil in place then lift and pull the coil out the side.
3. Remove the steel plate and the drain trough that hold the coils together.
4. Remove the bolts on both ends of the top coil holding it in place, then lift and slide the coil out.
5. Remove the bolts on both ends of the bottom coil holding it in place, then lift and slide the coil out.

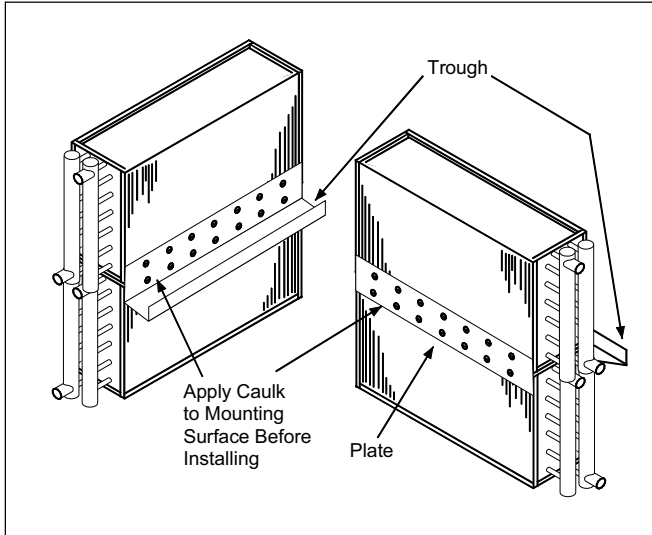
#### Installing Stacked Coils

1. Slide the bottom coil through the opening in the coil section onto the bottom coil rests. The coil must be placed up against the coil bulkheads to prevent any air bypass around the coil. Once the coil is in place, bolt the coil to the section.
2. Slide the bottom coil through the opening. The coil must be placed up against the coil bulkheads to prevent any air bypass around the coil. Once the coil is in place, bolt the coil to the section.
3. Caulk the mounting surface of the steel plate and install the plate on the coils.
4. Caulk the mounting surface of the drain trough and install the drain trough on the coils.



5. Caulk the seams between the coil casings and blockoffs.
6. Connect all piping and install the brass plugs for the vents and drains located in the connections. Install the access panel.

Figure 32. Locations of plate and trough - stacked coils



### Removing and Installing Staggered Coils

Staggered coils have two banks of coils positioned a few inches apart in the direction of airflow. Both coils are secured to the unit on the connection and opposite connection end of the unit.

1. Disconnect all piping and remove the brass plugs for the vents and drains located in the connections.
2. Panels on both the connection and opposite connection end of the coil section need to be removed to access bolts holding the coils in place. Each coil is held in place with bolts located in the corners of the coil side plates. Remove the bolts then lift and pull the coil out the side.
3. The bottom coil is fastened to the air block off plate. The screws attaching this plate to the coil must also be removed. Once fasteners holding the coil in place are removed, the coil can be pulled out either side of the unit.
4. Install coils in reverse order of removal.

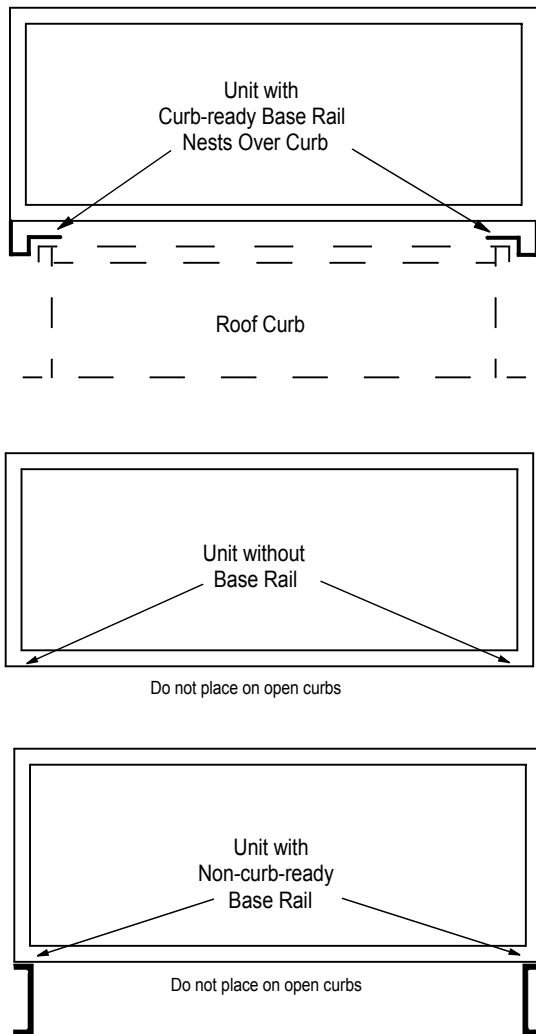
## General Description

### Curb-Ready Air Handler

USA Coil outdoor air handler unit can be equipped with a base assembly that provides a mechanical fit and seal to the building's Island Roof Curbing. USA Coil outdoor air handlers must be ordered from the factory with a curb-ready base in order to mount units on a roof curb. The curb-ready base is not available for field application to the Air Handler.

Figure 1 shows various base rail options for USA Coil outdoor air handlers. Units that do not have base rails and units with standard base rails must NOT be used with open curbs of any type.

Figure 1. Base Rail Options



The information provided in these instructions describes the curb kits that are ordered and provided with the USA Coil outdoor air handler. The curb kits are intended to be installed as described and are not intended to be modified or used in conjunction with other curb mounting features or apparatus.

The dimensional and support requirements are outlined to provide a basis for field designed and applied roof curbs. It is important that the weight and strength factors be carefully

followed when applying this roof curb and any curbs that may be field designed.

The curbing must support the air handler uniformly to keep the cabinet square and true. Uneven curbing support can cause distortion of the cabinet and the door openings.

### Unit location

The structural engineer should be involved to verify that the roof has adequate strength and ability to minimize deflection. Extreme caution should be taken when using a wooden roof structure. Units should also be located away from building flue stacks or exhaust ventilators to prevent possible entry of contaminated air through the outside air intake. Sufficient space should also be allowed around the unit for service clearance.

Locating the unit away from occupied spaces and over utility areas, corridors, and auxiliary spaces will help reduce the transmission of sound and vibration to occupied spaces. A concrete deck or pad is recommended when the unit is located over an occupied space where good acoustics are essential.

### Curbing Kit

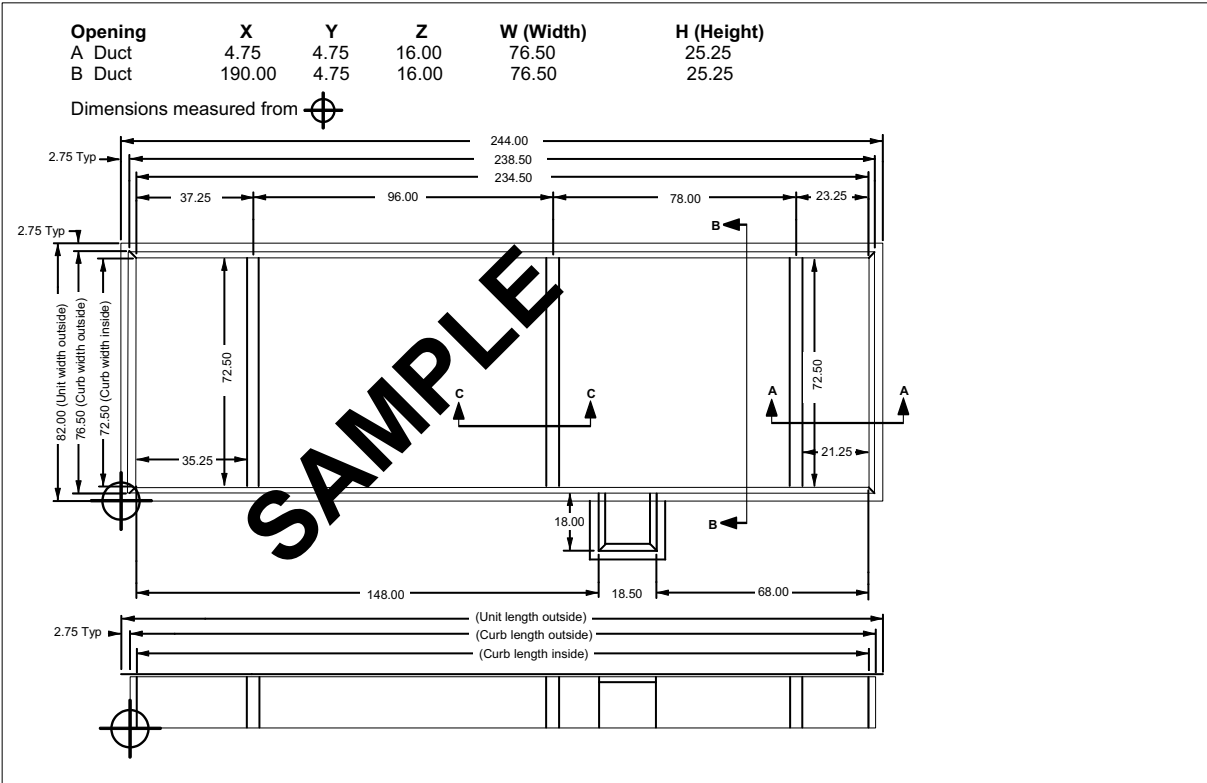
The USA Coil air handler roof curb kit is shipped unassembled and requires field assembly and attachment to the field designed building structural support. The building structural supports for curb mounted units must be approved by qualified individuals. It is important to follow all building codes and roofing standards.

The unit dimensions, weights and component details are provided within the submittal documents and are unique for each unit. The submittal documents also indicate the functional components within the air handler. While the total weight of each unit section is shown in the submittal documents, the locations of coils, motors and fans can cause part of the load to be concentrated in one area of an air handler section. Appropriate safety factors should be used to account for the weight distribution in determining structural load.

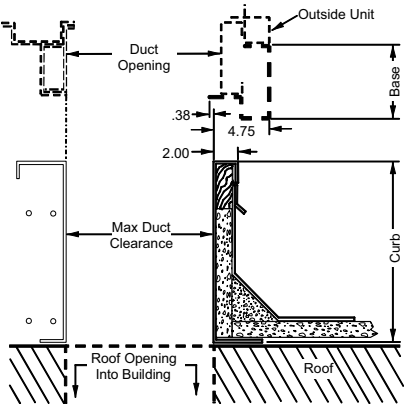
Allowance must be made for routing the air ducts through the roof curb. Refer to the submittal data for each unit for the proper dimensions of duct openings prior to installing ductwork. Figure 2 on page 4 shows a typical submittal drawing for a curb-ready USA Coil air handler. The unit submittal drawing illustrates the roof curb layout of the unit. The drawing shows the outline of the air handler unit, the outside dimension of the curbing top flange and the inside dimension of the curbing. The USA Coil units may have piping vestibule sections included as part of the unit selection and the roof curb will also have a vestibule curbing section attached to it. The submittal drawing shows the location and dimensions for the piping vestibule.

The submittal drawings also show the locations and dimensions of the air duct passages in the roof curb. The roof curb may be ordered as a unit option or it can be field supplied. View A shows a side view of the cabinet and View B shows an end view. If the unit is ducted in the middle (not adjacent to the curb), no allowances are required (View C).

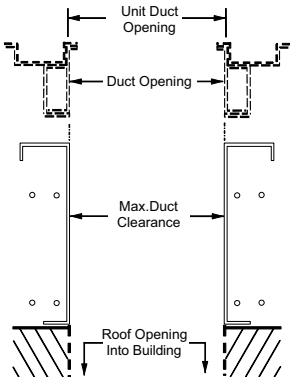
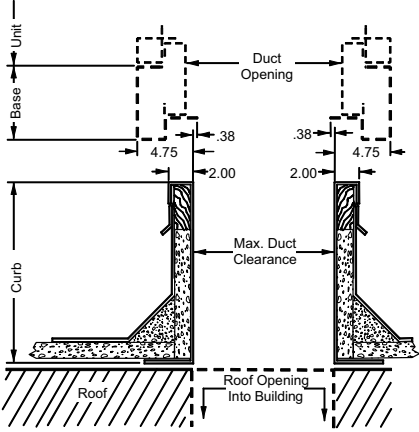
Figure 2. Typical submittal drawing and air duct allowances through the roof curb.



**View A – Side View of Ducted End**  
 Note that the inside of the curbing is 4.75 inches from the side of the unit.



**View B – End View of Ducted End**  
 Note that the inside of the curbing is 4.75 inches from the outside of the unit on both sides.



**View C – Side View of Unit Ducted In Open Space of Roof Curb**  
 The duct opening through the roof curb is the same as the unit duct opening.

Figure 3. Roof Curb Features.

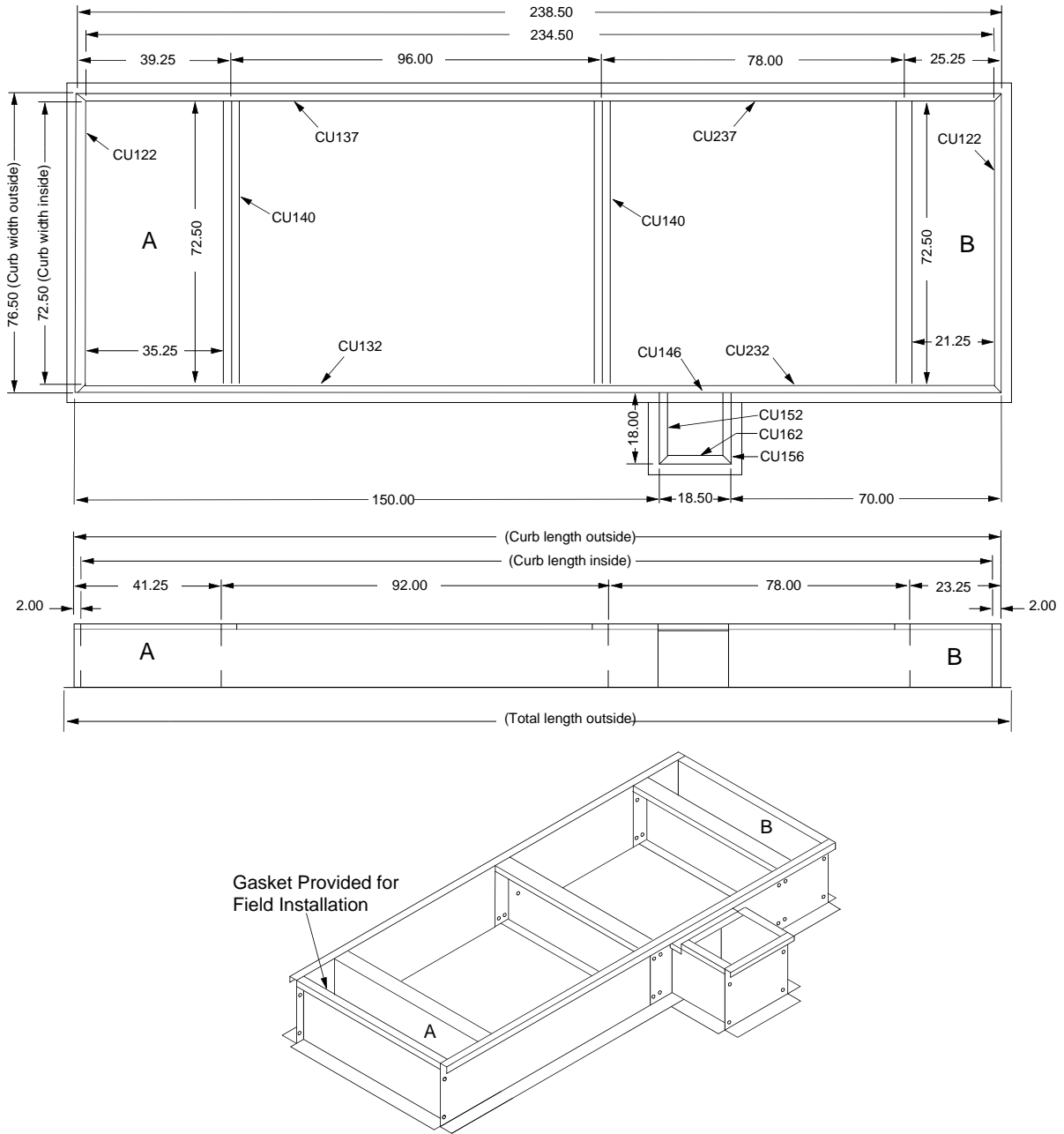


Figure 3 illustrates the features of the roof curb. Intermediate support channels are provided for support of the supply and return air ducts. If the curbing is field supplied, the duct supports can be provided in accordance with the installation requirements.

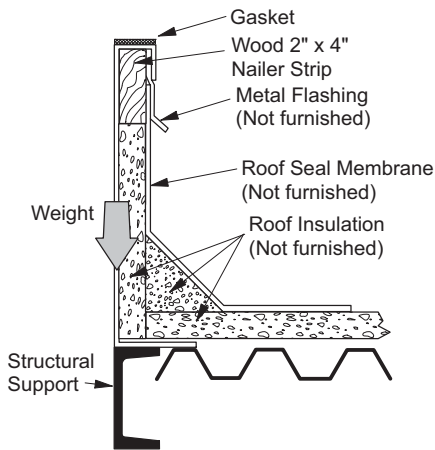
Intermediate supports are provided in the curb assembly at all points where the curb rails require two sections to be joined. For field provided roof curbs, it is recommended that intermediate supports be incorporated as appropriate for lateral rigidity of the roof curbs.

Intermediate supports are also provided on roof curbs that are over 107 inches wide. These supports are required at all points where the roof curb sides are joined. Support is also required at the entering and leaving edges of cooling coil sections and fan sections. These intermediate supports are required on all wide unit curbs to provide support to the unit across the open span of the curb.

## Curbing Kit Assembly

The weight of the unit is concentrated and supported at the inside wall of the roof curb. The structural system of the building and the interface with the curb must provide support at the points of concentrated loads. See Figure 4.

Figure 4. Weight of unit on roof curb.



Each curb kit contains a hardware package. The package contains 3/8 -16 x 1" bolts and nuts for assembly of the curb. Two 1/4 - 20 x 1/2" screws are included when the unit has a vestibule. Rolls of gasket are included to cover the top surfaces of the curb and supports.

The hardware kit includes a layout and assembly drawing of the curbing with a sketch of the assembly.

Compare the curb layout drawing to the submittal documents for the air handler to confirm that the details match.

Figure 3 illustrates a typical layout drawing of the roof curb. Note that each air handler will have a dedicated drawing that corresponds with the features that are included in the unit.

The curbing parts should be laid out according to the assembly drawing. The drawing shows dimensions of the parts and locations of intermediate cross members. The curb parts have labels attached that correspond with the locations of the parts. Parts that are identical have the same part numbers. End parts have number CU122 and center supports have number CU140.

The side supports are shown with sequential numbers CU137, CU 237 and so on for parts on one side of the drawing. Likewise, parts on the other side have sequential numbers CU 132, CU 232 in progression. The curb parts for the vestibule are marked with labels CU 152, CU 156 and CU162.

The dimensions for the locations of all parts are shown and should be checked carefully for proper assembly order.

Assemble the curb with the 3/8 inch diameter bolts and nuts that are provided. Always check the dimensions of the curb before final installation to the roof and building structure. Also check to be sure the curb is square and level.

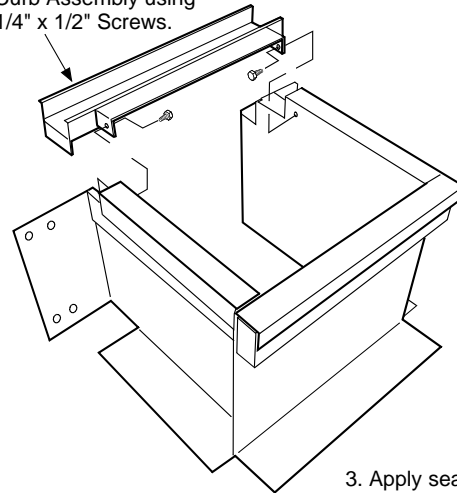
## Roof curbs with a vestibule assembly.

NOTE: The vestibule assembly channel, part number CU146 must be attached to the vestibule curb assembly before the vestibule assembly is attached to the main roof curb. Use two 1/4 x 1/2 screws to attach the channel.

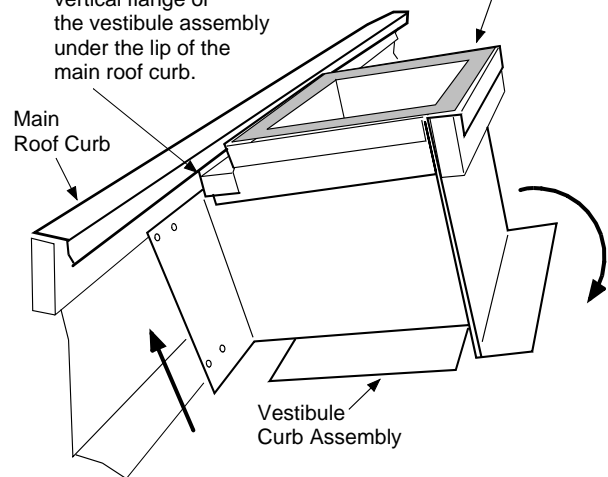
The vestibule assembly is then attached to the main roof curb by sliding the rear vertical flange of the vestibule curb under the lip of the main roof curb. Apply sealant and gasket material after the vestibule curb is in place. See Figure 5.

Figure 5. Install vestibule assembly on main roof curb.

1. Assemble Channel CU146 to Vestibule Curb Assembly using 1/4" x 1/2" Screws.



2. Slide the rear vertical flange of the vestibule assembly under the lip of the main roof curb.



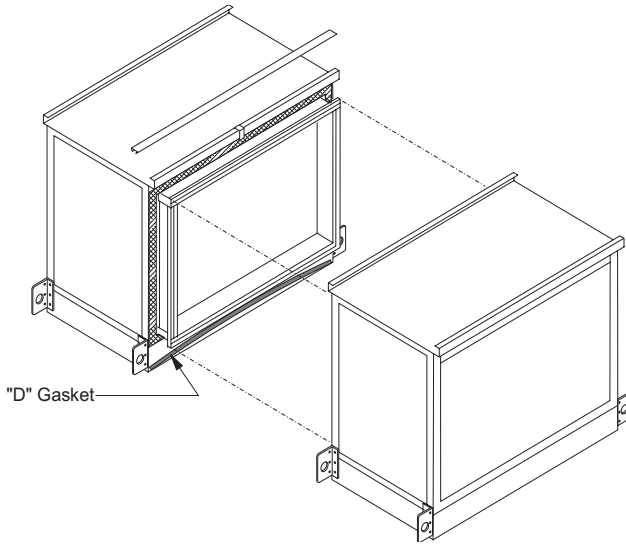
3. Apply sealant and gasket after Vestibule Curb Assembly is in place.

## Prepare The Unit For Installation On Curb

THE UNIT MUST BE LIFTED AS INDIVIDUAL SECTIONS ONLY. Some sections require removal of the lifting bracket to allow mating of the adjacent section(s). See Figure 10 on page 8.

A length of "D" gasket is attached to each section. This gasket MUST be installed to the unit base section as shown in Figure 6.

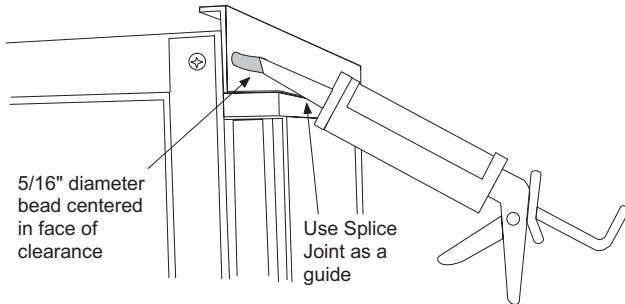
Figure 6. Attaching "D" gasket.



**IMPORTANT**  
 The gasket is to be installed in an arc shape with the ends lower than the center so that any moisture that may reach the gasket will be drained to the outside of the unit.

Apply a bead of sealant to the complete perimeter of the mating surface that has the splice collar projecting from the frame. Use the frame as a guide as illustrated in Figure 7.

Figure 7. Applying sealant.



**Install Unit On Roof Curb**

Check to see that all lifting brackets are secure and that the rigging cables and straps are clear of door handles or any other appendages of the unit.

The units have two inch interlocking splice collars at each mating face. Care must be used so that the flanges engage as the unit sections are mounted together. The units must be set tightly together during lifting as the curb gasket will grip the unit base and make moving the unit difficult.

A hardware package is included in each unit section that contains the bolts and nuts for fastening the unit sections together. Be sure to locate the hardware before the unit is placed over the open roof curb.

Fasten each section at both the bottom and the top using the bolts and hardware before setting the next section in position. Refer to Figure 8 and Figure 9.

Figure 8. Fasten bottom of section.

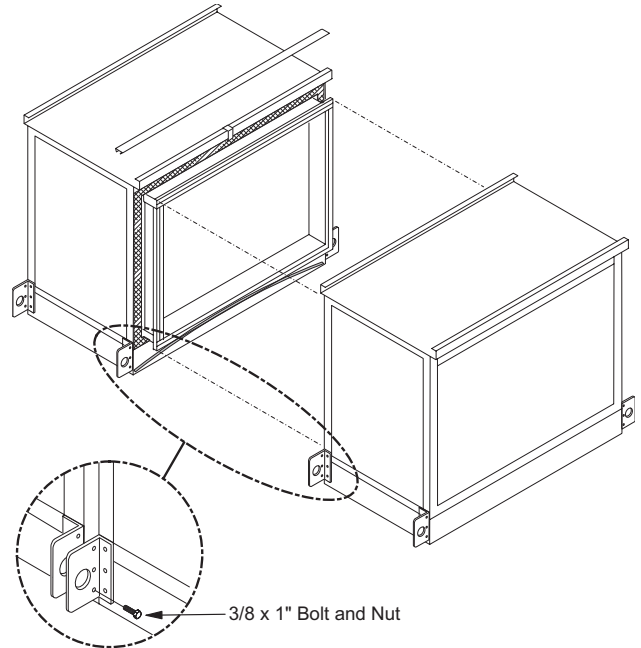
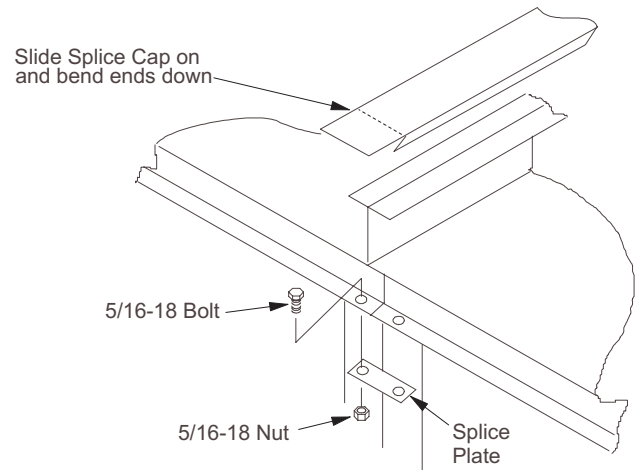
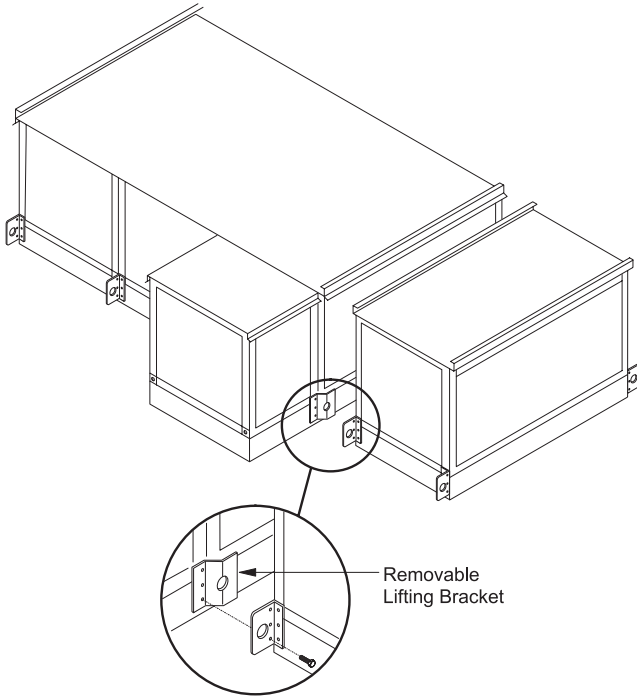


Figure 9. Fasten top of unit.



Units with vestibules must be handled so that the lifting bracket can be removed after the unit is placed on the curbing. Remove the lifting bracket that projects inward over the curbing. Save the self tapping bolts. When the adjacent section is placed in position, use self tapping bolts to secure the bases together as illustrated in Figure 10.

Figure 10. Remove vestibule lifting bracket.



Complete cabinet by placing sealant over any areas that appear to have remaining gaps. Install the cabinet top strips.

Assemble and install all air hoods in accordance with the instructions that are provided with hood.

### Installation of Piping and Wiring

Be sure that all piping, wiring and control penetrations that are made through the unit panels and floors are thoroughly sealed on both the inside and outside of the cabinet.

#### NOTICE:

**The base section of each cabinet has a drip pan installed below every panel that drains to the outside frame trough. Any holes cut through the bottom of the unit must also penetrate the drip pan. If holes are cut in the drip pan, they must be sealed to prevent moisture leakage.**

A single metal thickness pan is provided in the bottom of the vestibule. The pan can be removed if necessary. If holes are cut into the pan for piping passage, the holes must be sealed to prevent moisture leakage.

# Basic Warranty

## USA Coil & Air Standard Material & Workmanship 1 Year Warranty

### Basic Warranty - Material and Workmanship

Seller warrants, to the original buyer only, that any equipment manufactured by it will be free of defects in material and workmanship, under normal use and service, for one year from date of shipment. Seller's obligation under this warranty shall be strictly and exclusively limited to repairing or replacing parts and materials, free of charge, f.o.b. our plant, which, in seller's judgement are defective. Seller can't control the environment nor the manner in which the equipment is used; therefore this warranty does not cover corrosion of equipment during use, or deterioration caused by conditions of use, or that applications of finishes supplied by others is sufficient, or that finishes applied are suitable for the Buyer's environment. Seller assumes no responsibility for reimbursing repair or replacement expenses incurred without its prior written authorization.

Buyer shall be responsible for all labor costs incurred in connection with such repair or replacement at installation site. Buyer shall also be responsible for all costs in removing, packing and shipping defective equipment back to seller. Seller shall be responsible for freight charges back to its factory and Buyer shall use the Seller's designated means to transportation. It is the total responsibility of the Buyer to send back equipment samples quickly (it requested by Seller) to determine possible warranty claims.

### Disclaimer of Warranties and Limitation of Remedies

Seller makes no other warranties, expressed or implied with regard to goods and services provided by seller other than those set forth herein. Any implied warranty of merchantability or fitness for a particular purpose of buyer which exceeds the foregoing warranty is hereby disclaimed by Seller.

Seller will not be liable for any direct or indirect consequential or incidental damages, losses or expenses, including, but not limited to; commercial losses, business interruption, or damages resulting to property other than that which is the subject of the sales transaction, nor shall Seller be liable for any personal injuries arising in connection with the sale, resale of operation of its goods or ability of the buyer to use the goods of Seller for any reason whatsoever.

Limitation of remedy here stated shall apply to ALL warranties arising out of the sale here subject. It is understood between the parties that damage to the contents of the product herein vended, ineffectiveness of the product, or other unintended consequences may result because of many factors including the manner of use of application of the product, all of which are beyond the control of Seller. All such risks shall be assumed by the Buyer. Seller's maximum liability shall not, in any case, exceed the price of the goods claimed to be defective. Seller will not be liable for the infringement of any patents by the Buyer's use of any materials delivered herein.

No promise, representation or affirmation of fact, written or oral, of the Seller or its agent or employees, other than as stated herein, shall constitute a warranty of seller or give rise of any liability or other obligation of Seller, unless specifically agreed to in writing by Seller.