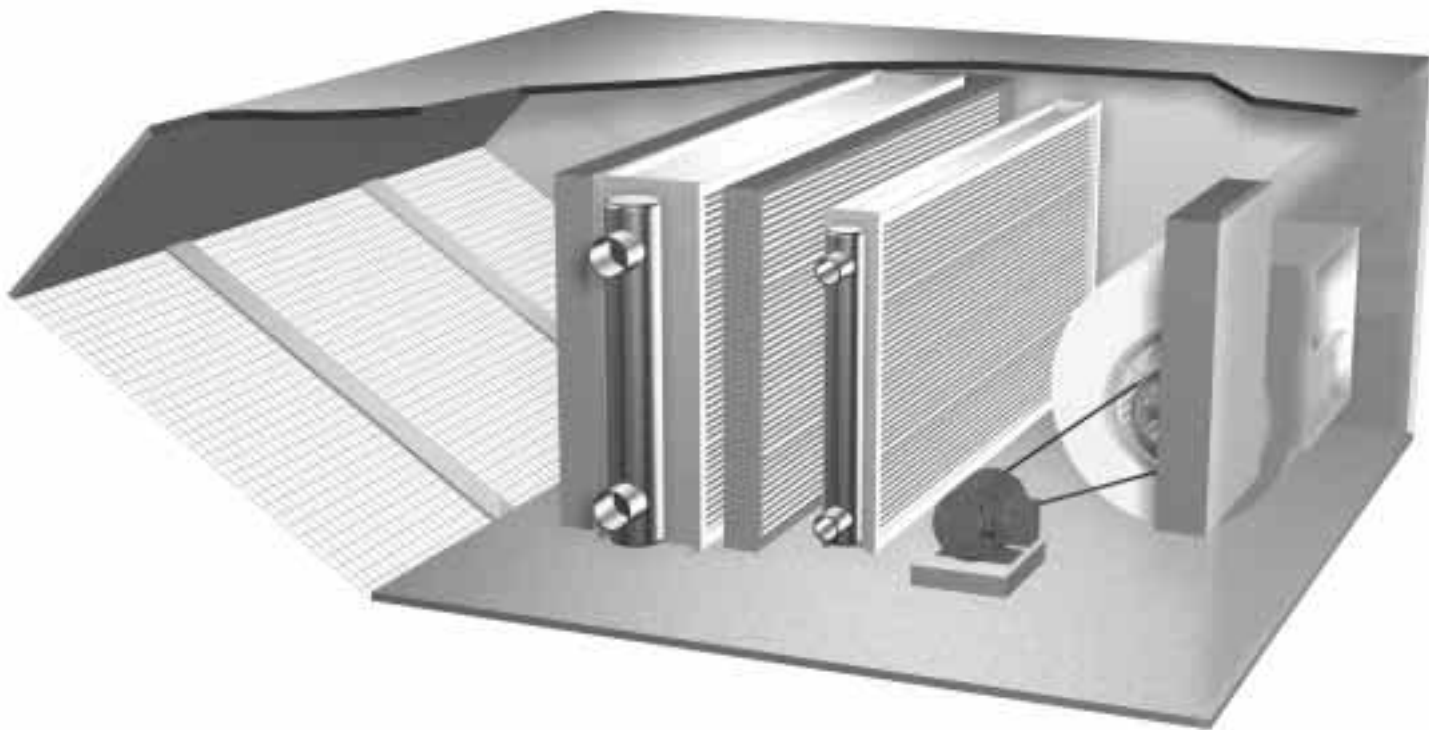


Installation, Operation and Maintenance Instructions **for Neutralizer 100% Outdoor Air Ventilators**



WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

**This manual is the property of the owner, and is required for future maintenance.
Please leave it with the owner when you complete the job.**



GREENHECK

P.O. BOX 410 SCHOFIELD, WISCONSIN 54476-0410
PH. 715-359-6171

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Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove to be defective during the warranty period will be repaired or replaced at our option.

The motor is warranted by the motor manufacturer for a period of one year. Should the motor prove defective during this period, it should be returned to an authorized motor service station. Greenheck will not be responsible for any installation or removal costs.

Due to continuing research, Greenheck reserves the right to change specifications without notice.

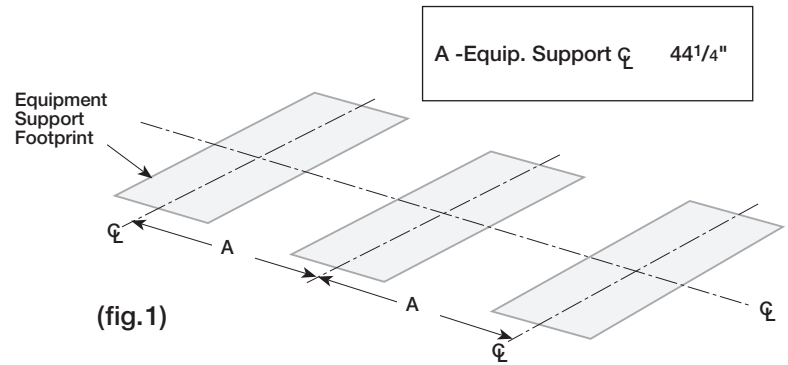
Installation Instructions for: NV-45 w/Horizontal Discharge

Step 1 Mounting the Unit

Arrangement HZ can be mounted on a curb with an equipment support (see curb inst.) or on three equipment supports (figs. 1&4).

Arrangement HZ can also be used for indoor applications mounted hanging (fig. 5), inline as part of an air handling system, or base mounted. Mounting hardware to be provided by others.

In any case, adequate support of the unit is required.



Step 2 Attach Ductwork to Unit Discharge

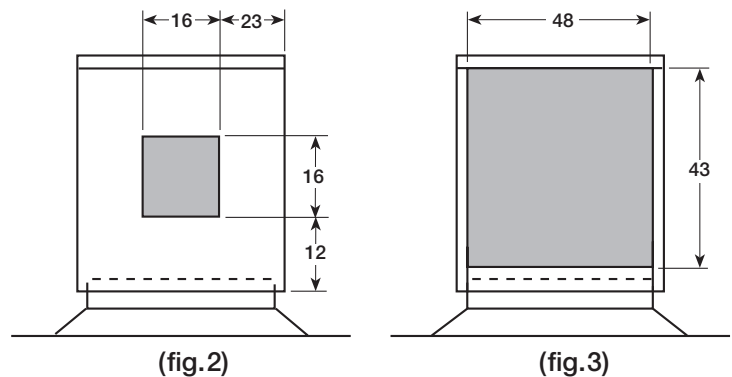
Chart and drawing (fig.2) below shows opening size (ID) and location for a discharge collar. Also included is the recommended straight duct length for optimal performance. Greenheck recommends attaching ductwork to collar using a rubber duct section at the unit to eliminate vibration.

Step 3 Attach Ductwork to Unit Intake

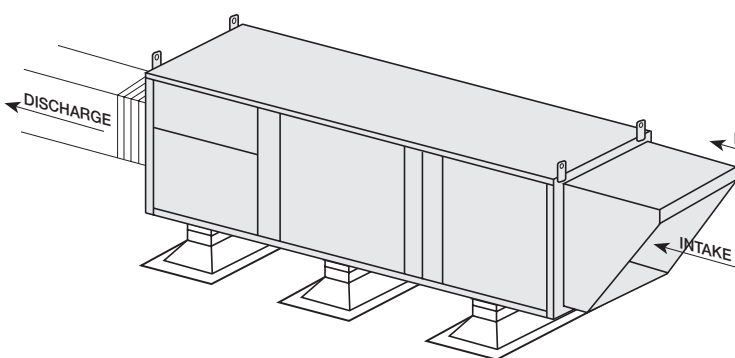
For non-weatherhood installations, fig. 3 below shows dimensions for supply opening (ID). Attach ductwork to perimeter flange using a rubber duct section at the unit to eliminate vibration. Design the remaining ductwork for minimal losses to allow the unit to operate properly.

Recommended Duct Size/Location and Intake Dimensions

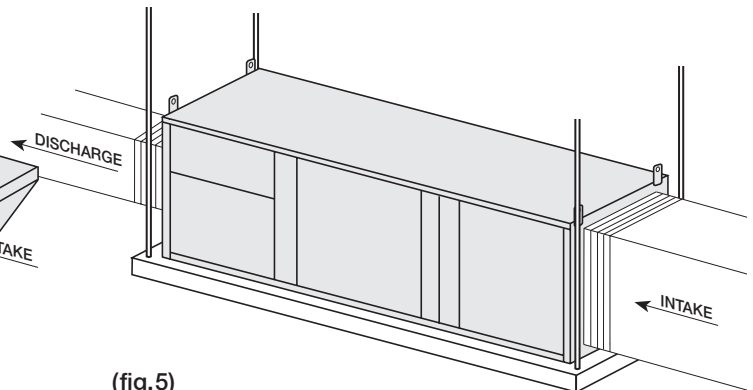
Minimum Straight Duct Length - 54"



Typical Installations



(fig.4)
Roof mounted **arrangement HZ** with weatherhood, mounted on three equipment supports. Ductwork is attached to discharge collar with rubber boot transition.



(fig.5)
Arrangement HZ shown as an indoor hanging installation with intake and discharge ductwork installed. (Hanging support structure for unit is by others).

Installation Instructions for: NV-45 w/Downblast Discharge

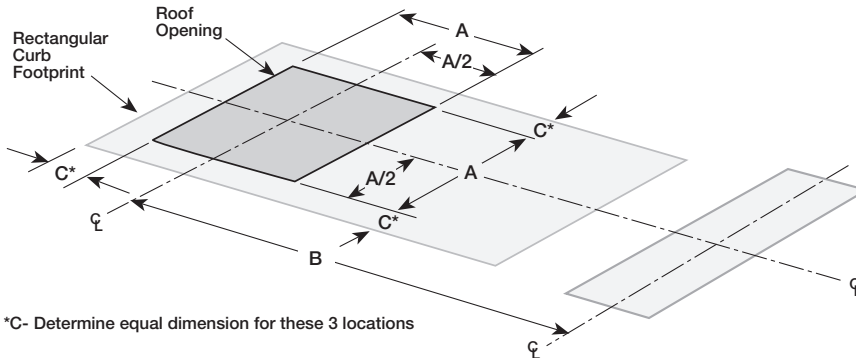
Before beginning this installation:

Make sure that there is room to access the unit from all sides.
Make sure inlet of unit is located well away from any exhaust fans.

Step 1 Roof Opening

Determine the center of the supply duct roof opening. The chart below shows the maximum recommended roof opening dimensions. These sizes can be smaller based on codes and ductwork sizes.

For Installations using rectangular curb

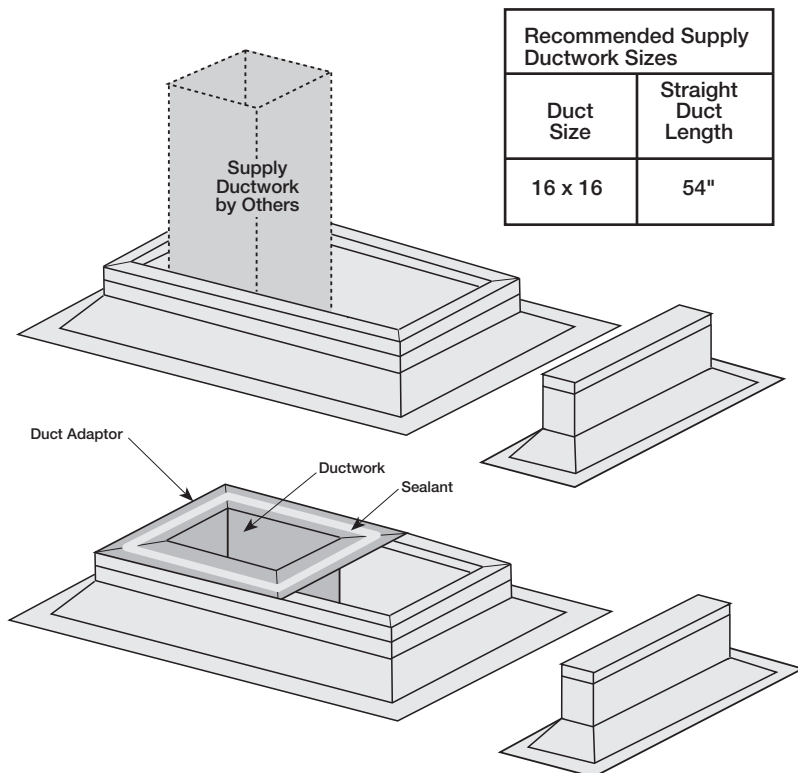


A - Max Roof Open. Sq.	47"
Supply Duct φ to Equip. Support φ	88 1/2"

Step 2 Install Roof Curb and Equipment Support

For rectangular curbs, center curb on 3 sides of roof opening, as shown in above installation diagram, by determining C dimension (varies per unit/curb size). For either installation, level the curb and shim if necessary. Attach curb to roof and flash in place.

If equipment support is needed, refer to chart in step 1 for dimensional location based on NV unit size. Attach to roof in the same manner as the curb. Remove metal cover, flash to wooden nailer, and reinstall cover.



Step 3 Install Ductwork

The chart shows at left shows the duct sizes and straight lengths recommended for optimal performance (AMCA Publication 201-90). Using duct sizes less then recommended lengths will affect fan performance. Good duct installation practices should be followed for the remaining ductwork. The use of a duct adaptor with the supply duct is strongly recommended to properly align the ductwork with the supply fan discharge. The duct adaptor is only a guide and is not intended to be used as support for the ductwork.

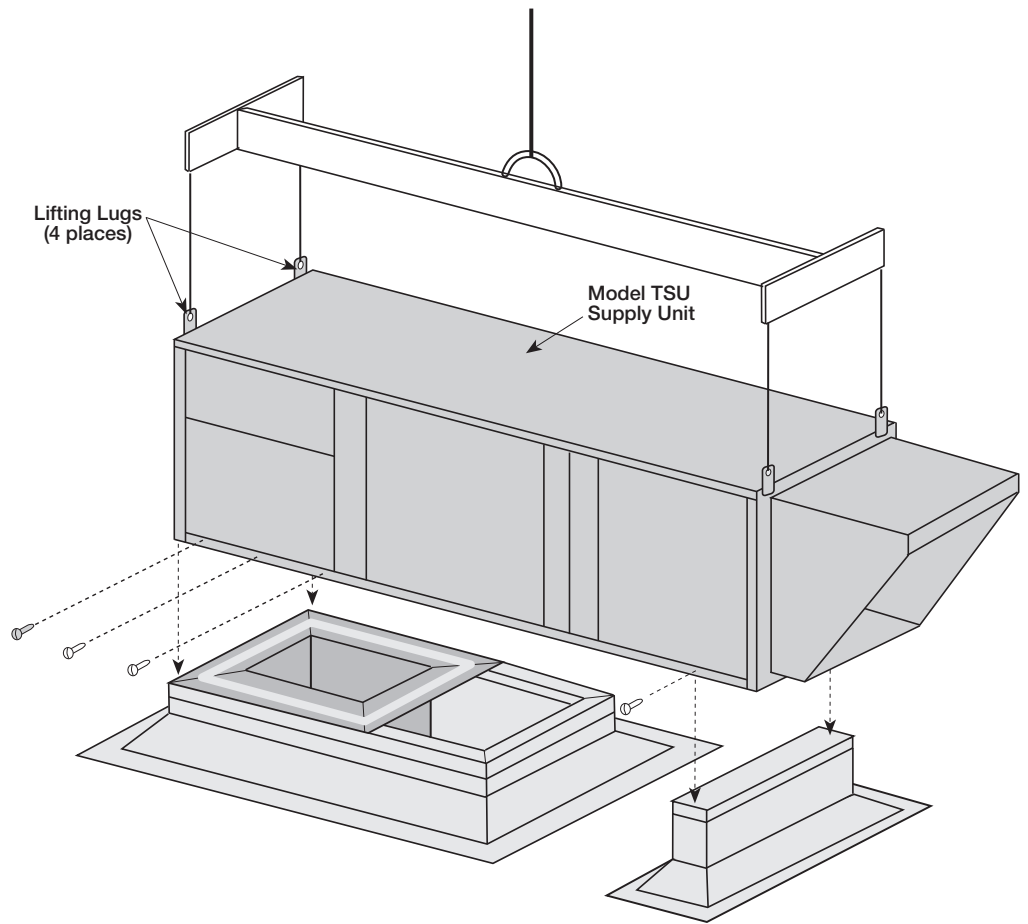
Step 4 Apply Sealant

Before installing unit apply a sealant or a gasket around the perimeter of the supply duct adaptor to isolate the fan and minimize vibration.

Step 5 Install Supply Unit

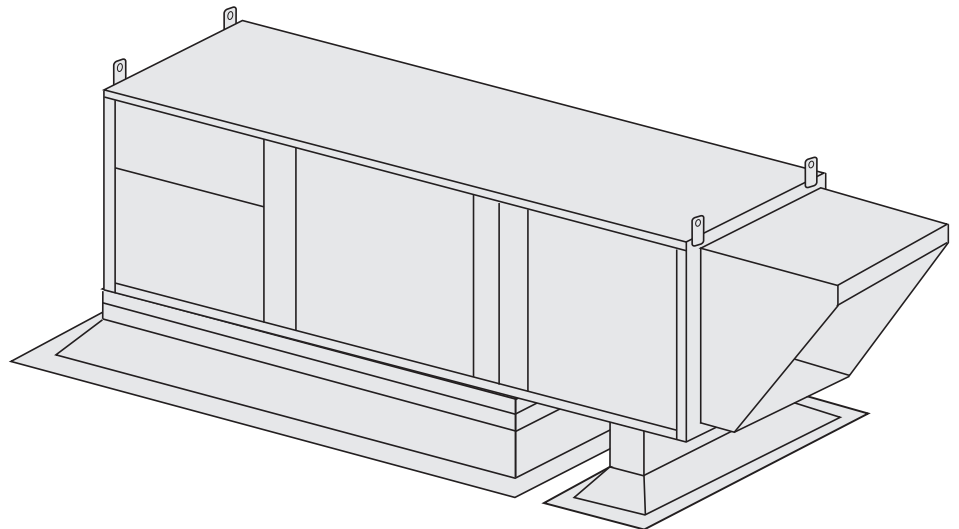
Use a crane and a spreader bar hooked to the factory lifting lugs (as shown in the diagram) to lift and center the NV unit on the curb and equipment support. Use self-tapping sheet metal screws to fasten unit to the curb and equipment support through holes provided.

Electrical and pipes connections can be made at this time.



Complete Installation

Illustration shows the complete installation of downblast NV with filter section and weatherhood.



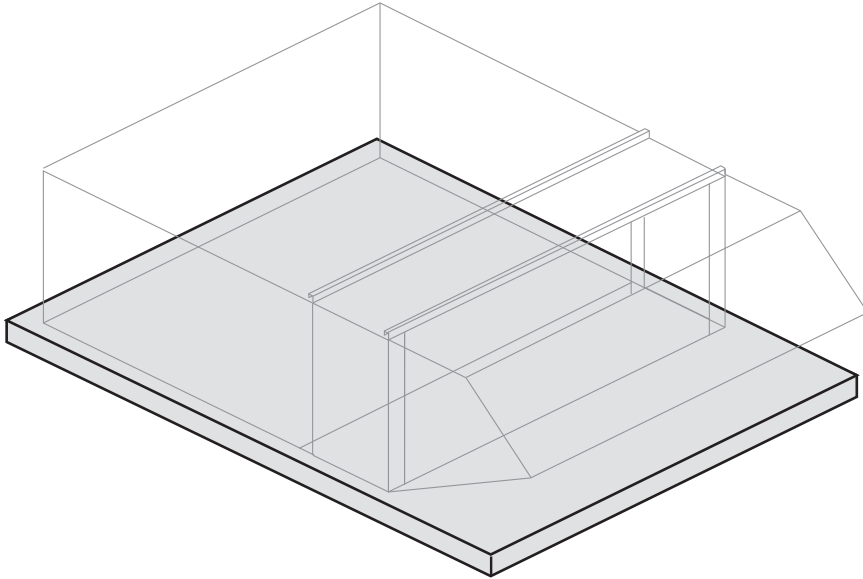
Installation Instructions for: SLAB, RAIL, AND CURB MOUNTING NV-90 and NV-120 w/Horizontal Discharge



Before beginning this installation:

Make sure that there is room to access the unit from all sides.

Make sure inlet of unit is located well away from any exhaust fans.

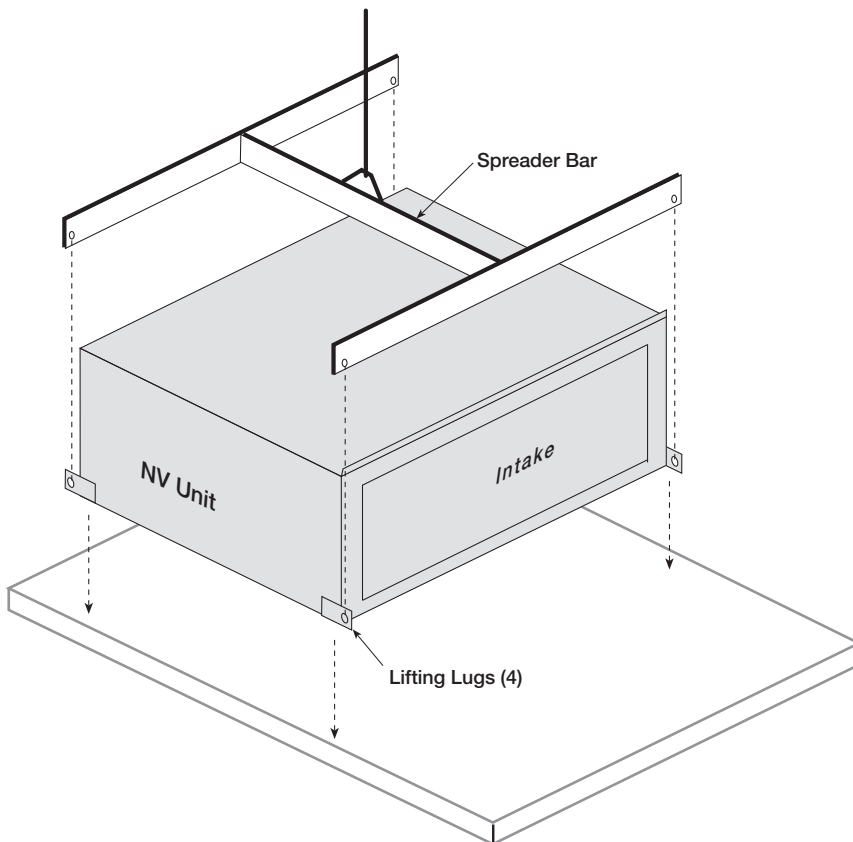


1a. Slab Construction

Recommended Size: 1ft. wider and longer than total unit size.

Recommended Material: Concrete at least 4" thick.

Slab should be set and leveled on a sufficient bed of gravel for proper drainage.

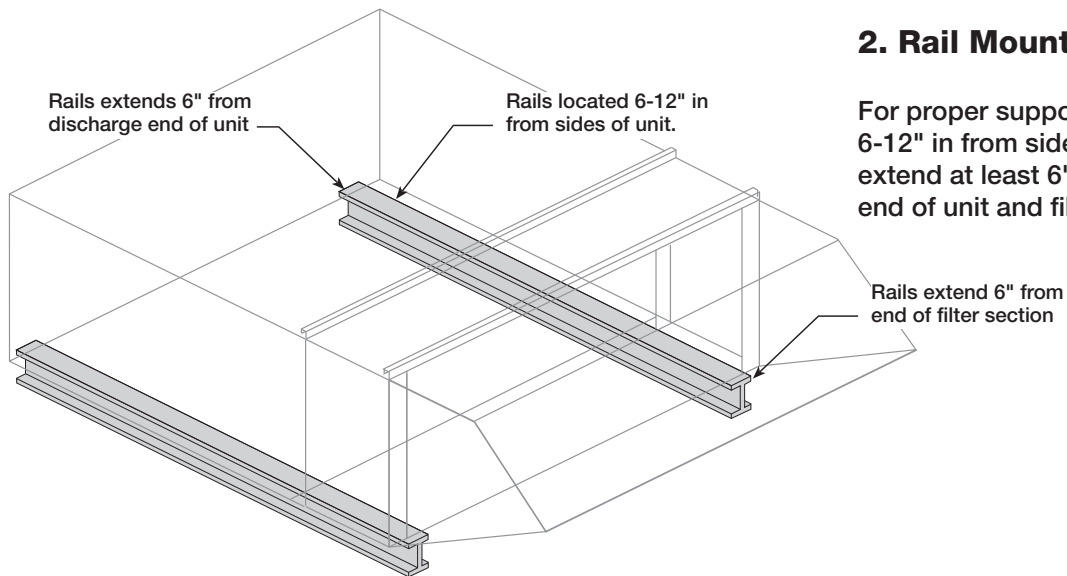


1b. Install Unit

Use a crane and spreader bar to prevent damage to unit. Lifting lugs are provided as shown in illustration.

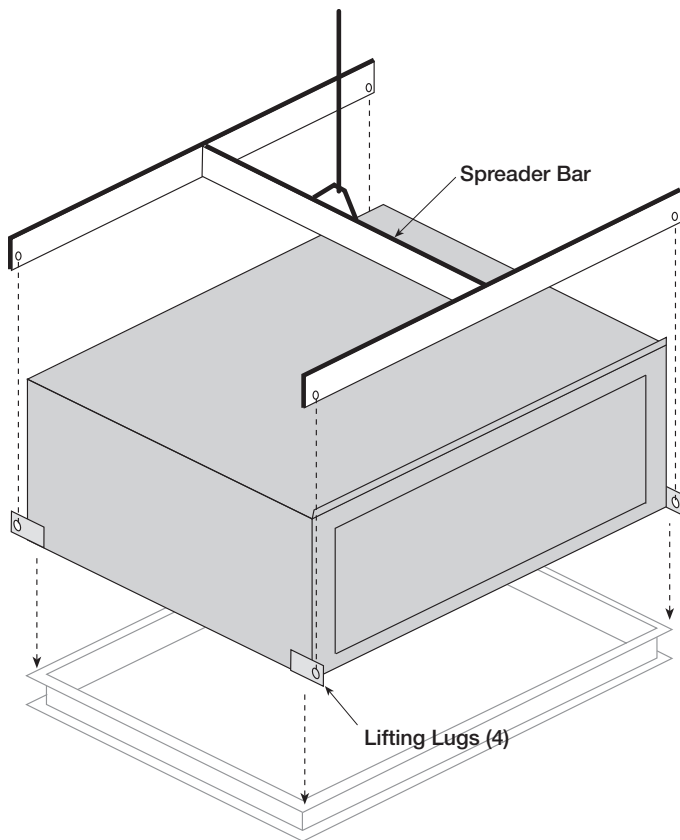
Its is highly recommended that all accessory items be lifted separately and attached after the NV unit is in place.

Unit may be fastened to slab through lifting lugs.



2. Rail Mounting

For proper support, rails should be located 6-12" in from sides of unit and should extend at least 6" beyond both discharge end of unit and filter section.



3. Curb Mounting

(See page 9 for curb assembly)
Install unit on curb using a crane and spreader bar to prevent damage to unit. Lifting lugs are provided as shown in illustration.

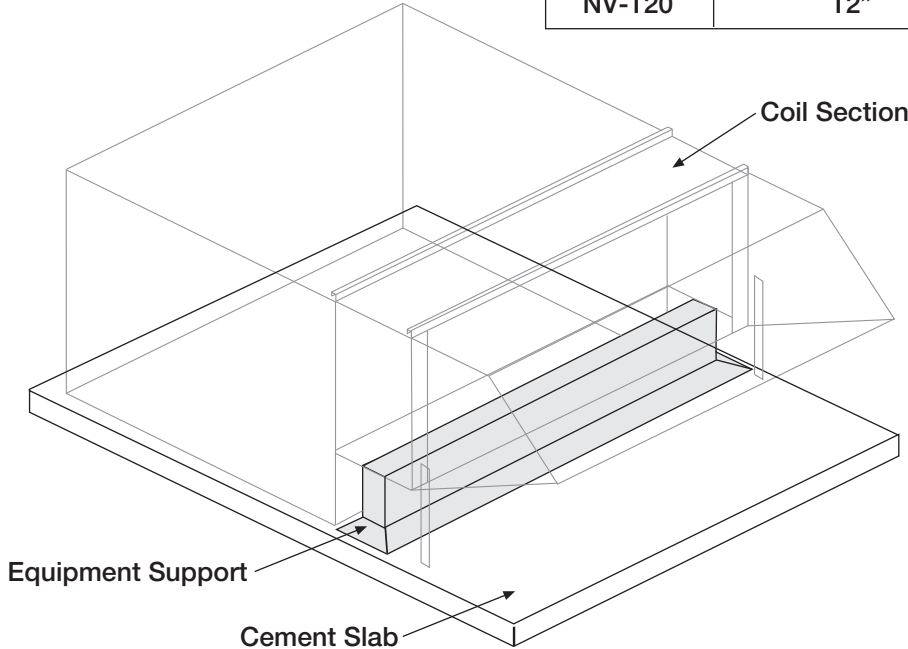
It is highly recommended that all accessory items be lifted separately and attached after the unit is set in place.

4. Optional Up-stream Heating Coil

If an optional up-stream heating coil is provided with the unit an additional equipment support may be required. If filters only are provided in this section, additional support is not needed. Follow the guidelines below for determining the coil section support required. **Page 18** lists unit weights for equipment support load requirements.

Equipment Support Requirements:

	Slab/Rail Mount	Curb Mount
NV-90	None	Curb Height
NV-120	12"	Curb Height + 12"



Typical NV-120 installation on cement slab with optional up-stream heating coil section .

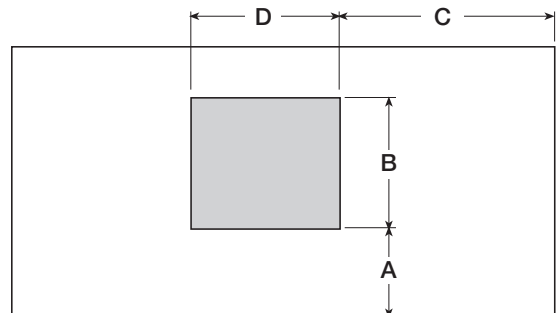
See page 10 for attachment instructions.

5. Attach Ductwork to Unit Discharge

Chart and drawing below show opening size (ID) and location for discharge collar. Also included is the recommended straight duct lengths for optimal performance. Greenheck recommends attaching ductwork using a rubber duct section at the unit to eliminate vibration.

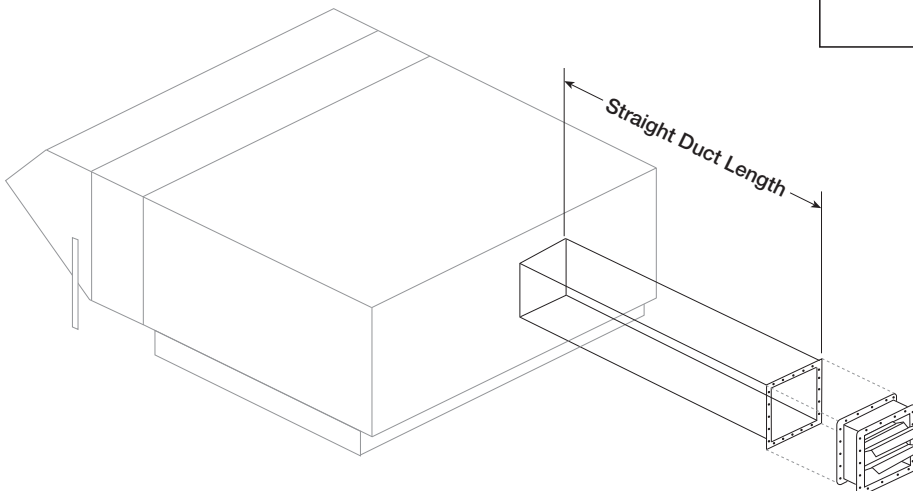
Discharge Opening Sizes

	A	B	C	D	Straight Duct Length
NV-90	16 ¹ / ₄	24	34 1/2	22 ³ / ₈	81
NV-120	16 ¹ / ₄	25 ¹ / ₂	34	23 ¹ / ₄	96



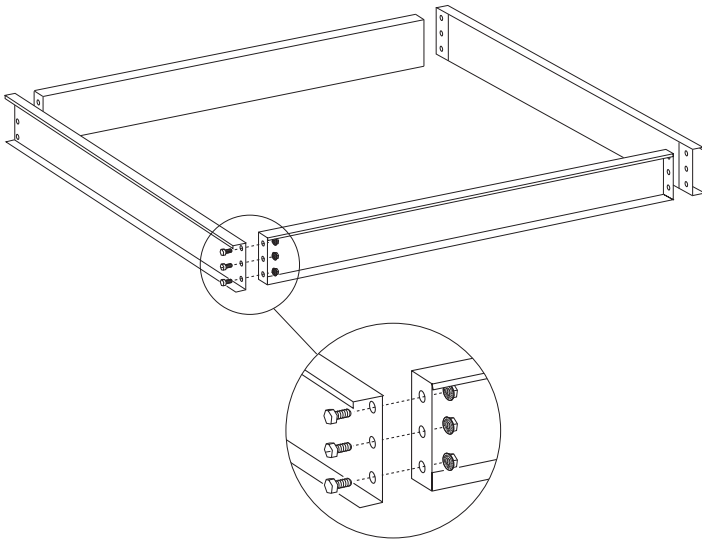
Back View

NV-90 and NV-120



Installation Instructions for: CURB MOUNTING* NV-90 and NV-120

*For installations using Greenheck's optional roof curb.



1. Assemble Roof Curb

Curbs are shipped knockdown and require assembly by others. Assembly instructions are also included with curb.

Assemble curb sections as shown using hex bolts and lock nuts supplied with curb.

Detail shown is typical for all four corners.

2. Locate and Cut Roof Opening

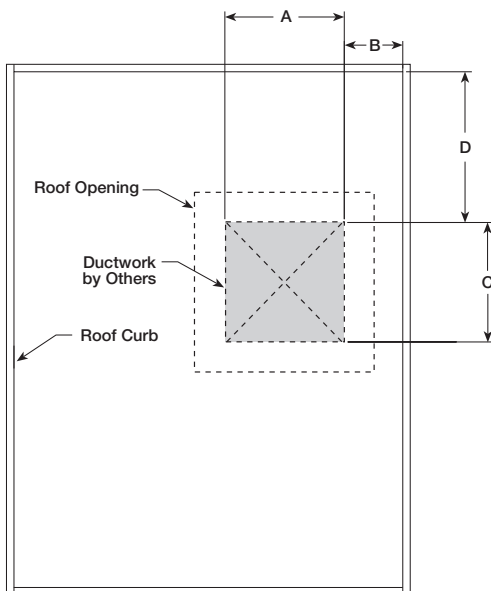
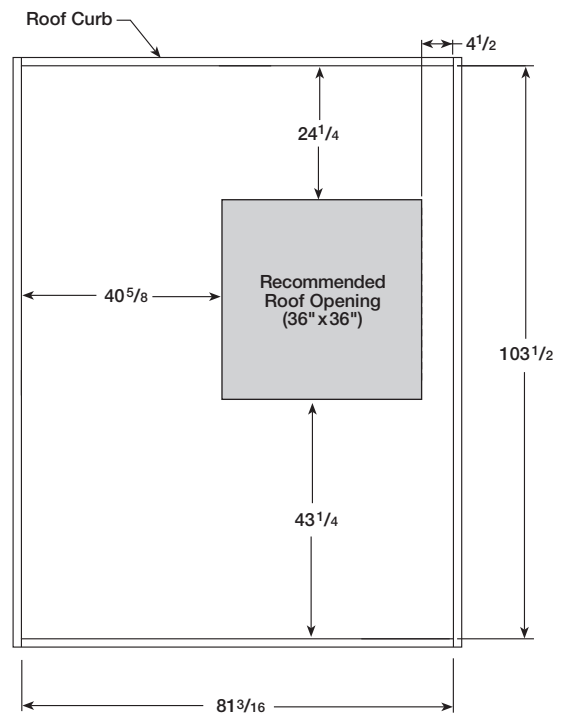
When locating unit, make sure there is room to access unit from all sides. Make sure inlet of this unit is located well away from exhaust fans.

Roof Opening for NV-120 and NV-90 = (A) 36" x (B) 36"

3. Install Curb

Located curb over roof opening with dimensions shown to the right and fasten in place.

Check that diagonal dimensions are within $\pm 1/8"$ of each other and adjust as necessary. Shim as required to level.

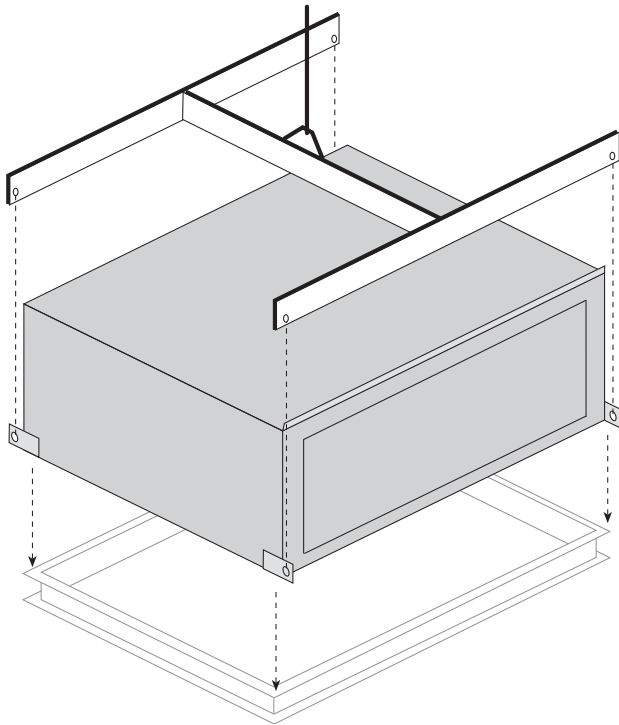


4. Install Ductwork

The following chart shows the duct sizes and straight lengths recommended for optimal performance (AMCA Publication 201-90). Using duct sizes less than recommended lengths will affect fan performance. Good duct installation practices should be followed for the remaining ductwork.

Duct Locations:

	A	B	C	D	Straight Duct Length
NV-90	24	9 ³ / ₈	24	30 ¹ / ₄	81
NV-120	26	9 ¹ / ₂	26	29 ¹ / ₄	96



5. Install Unit.

Use a crane and spreader bar to prevent damage to unit. Lifting lugs are provided as shown in illustration.

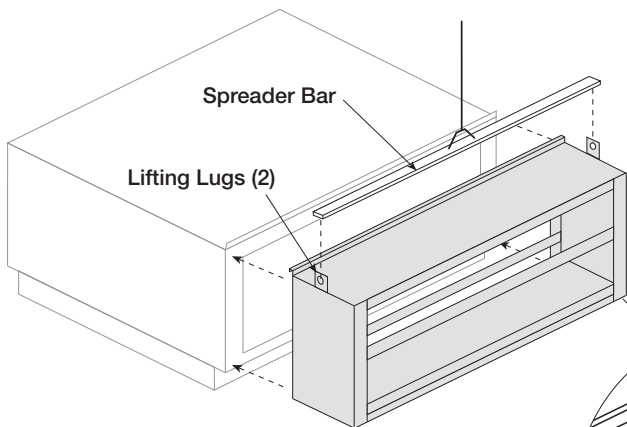
It is highly recommended that all accessory items be lifted separately and attached after the unit is in place.

Electrical and pipe connections can be made at this time.

6. Attach Filter/Coil Section (if included)

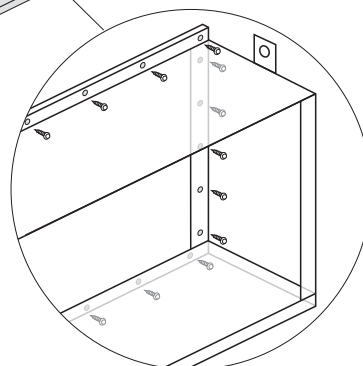
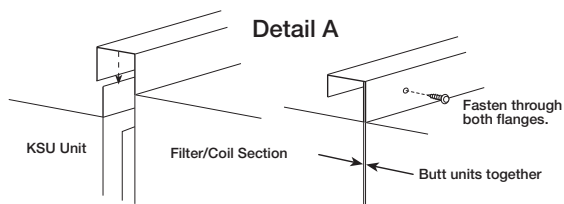
Use a crane and spreader bar hooked to factory lifting lugs (as shown in diagram) to lift and center the filter section on the NV unit. Note that the top U-shaped flange on the filter section fits over the vertical flange of the NV unit (see detail A). Use sheet metal screws to fasten the filter section to NV unit. Mounting holes are prepunched, see diagram for approximate hole locations.

Filters ship separately. To install, remove side panel on filter section and slide into filter channels. Note arrows on filters for correct orientation.



Note:

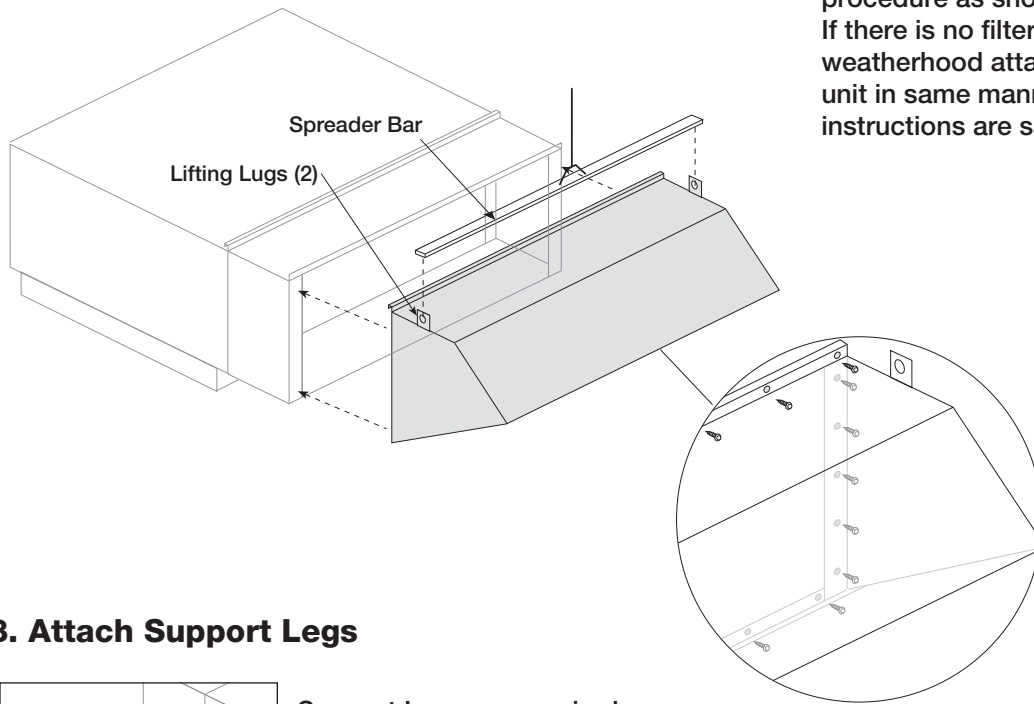
If the optional up-stream heating coil section is included with the unit, special support for this section is required. See page 8 for requirements.



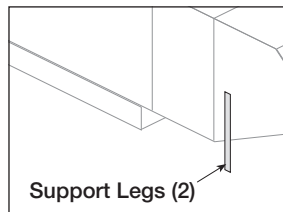
← Filter /Coil section fastener locations typical for entire section. Top fasteners are accessed from outside, side fasteners are accessed from inside, bottom fasteners are accessed from underneath filter section (Note: bottom fasteners are not required for slab mounted units).

7. Attach Weatherhood

Use a crane and spreader bar hooked to factory lifting lugs (as shown in diagram) to lift and center the weatherhood on the filter section (same procedure as shown in previous step). If there is no filter section, the weatherhood attaches directly to NV unit in same manner. Fastener instructions are same as Step 6.



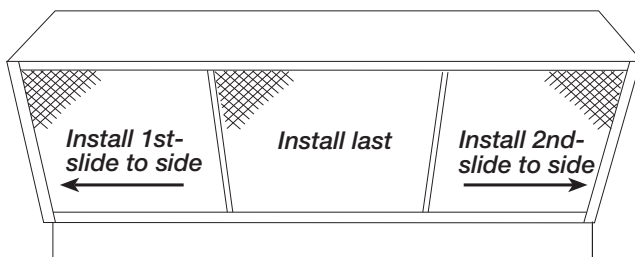
8. Attach Support Legs



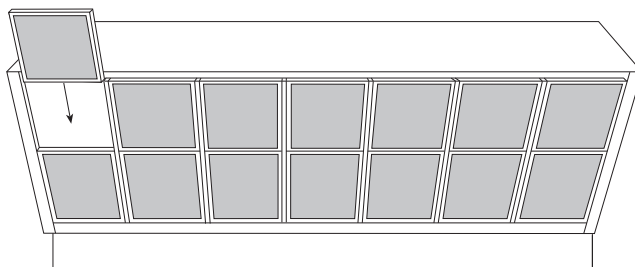
Support Legs are required on weatherhood section. Attach through pre-punched holes in weatherhood using supplied fasteners.

Weatherhood fastener locations typical for entire section. Top fasteners are accessed from outside, side and bottom fasteners are accessed from inside.

9. Install Birdscreen or Optional Weatherhood Filters



Birdscreens simply slide up and into opening, resting on channels. Install side screens first and slide to edges of unit. Install center screen last. No fasteners are required.



Filters simply slide down into filter tracks as shown. No fasteners are required. Note arrows on filters for correct airflow.

Electrical Instructions

Before connecting power to the unit, read and understand the following instructions and wiring diagrams. Complete wiring diagrams are attached inside the door(s) of the unit.

All wiring should be done in accordance with the National Electrical Code ANSI/NFPA 70-latest edition and any local codes that may apply. In Canada, wiring should be done in accordance with the Canadian Electrical Code. The equipment must be properly grounded.

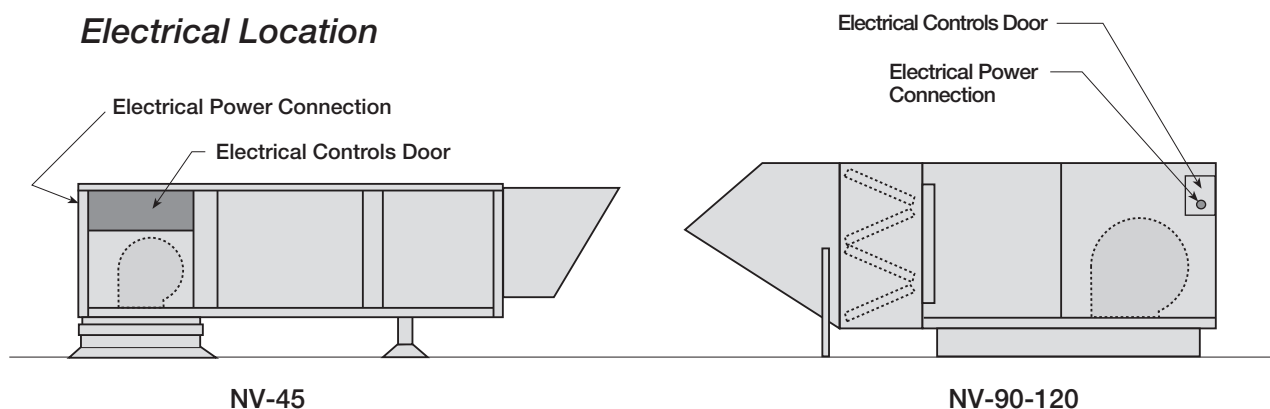
CAUTION !

If any of the original wire must be replaced, the replacement wire must have a temperature rating of at least 105°C, except for energy cut-off or sensor lead wire which must be 150°C.

DANGER !

High voltage electrical input is needed for this equipment. This work should be performed by a qualified electrician.

Electrical Location



NOTE: Any wiring running through the NV unit in the airstream must be protected by flexible metal conduit, metal clad cable, or raceways.

Sequence for wiring NV unit:

For units *without* control centers:

The motor nameplate is to be used for determining the voltage and amperage required by the unit.

For units *with* control centers:

1. The unit's nameplate states the voltage and total amperage required.
The main feeder supplying power to the unit should be sized for the label's voltage and amperage.
2. The main power line should be connected to the disconnect switch.
Make sure that the disconnect lugs are securely tightened.
3. Connect control panel wiring to terminal strip in the control center.
Greenheck's standard control voltage is 120/60/1.
4. When an optional convenience outlet is provided, a separate power supply must be provided to the receptacle. This circuit must be on a ground fault breaker.

CAUTION

Any wiring deviations may result in personal injury or property damage. Greenheck is not responsible for any damage to, or failure of the NV unit caused by incorrect final wiring.

SYSTEM STARTUP

For proper unit function and safety, follow everything in this startup procedure in the order presented. This is to be done after the electrical connections are complete.

Special Tools Required

- Voltage meter
- Incline manometer or equivalent
- Tachometer
- Thermometer
- Amperage meter

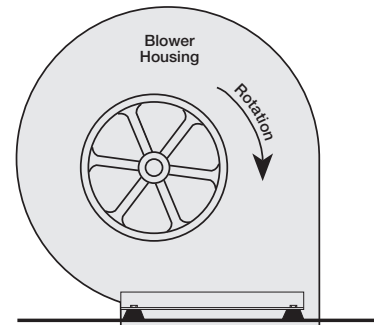
1. Check Voltage

Before starting the unit compare the supplied voltage with the unit's nameplate voltage and the motor voltage.

2. Check Blower Rotation

First hand rotate the blower to ensure that the wheel is not rubbing against the scroll. If the blower is rotating in the wrong direction, the unit will move some air but not perform properly. To check the rotation, open the blower access door and run the blower momentarily to determine the rotation. To reverse the rotation, turn the power off and use the following procedure:

- For single phase units, rewire the motor per the instructions on the motor.
- For three phase units, interchange any two power leads.
This can be done at the motor starter.



3. Air Volume Check and Measurement

Along with the building balance, the units air volume (cfm) should be measured and compared with its rated air volume. This unit is flexible for varying air volume (units above 15 Hp may have fixed drives), but the actual air volume should be known for making final adjustments.

The most accurate way to measure the air volume is by using the pitot traverse method in the ductwork away from the blower. Other methods can be used but should be proven and accurate.

To adjust the air volume, change the fan RPM or the system losses. See Trouble Shooting Section in this guide.

4. Measure Motor Voltage, Amperage and Fan RPM

All access doors must be installed except the control center door. Measure and record the input voltage and motor amperage(s).

To measure the fan RPM, the blower door will need to be removed. Minimize measurement time because the motor may over amp with the door removed.

With blower door in place compare measured amps to the motor nameplate full load amps and correct if overamping. See the trouble shooting section in this guide.

5. Settings for Optional Components

Freeze Protection:

This de-energizes the blower if the output temperature is below the set point. A timer allows the blower to operate during startup. This will reset when turned off.

Typical settings are:

Discharge temperature = 35°F Timer = 5 minutes

Instructions for Coils

Steam Coils

Application Recommendations:

Satisfactory operation and service life are best ensured when coils are installed with proper piping, trap, and support arrangement. The following notes and figure 1 (page 15) are recommended for the coil unit installation and operation.

General:

1. Provide separate supports and hangers for the unit and the piping.
2. Be certain that adequate piping flexibility is provided. Stresses resulting from expansion of closely coupled piping and coil arrangement can cause serious damage.
3. Standard steam coils are pitched in the casings when installed for horizontal air flow. The CASING MUST BE LEVEL after the unit is installed for proper condensate drainage. If condensate is not removed the coil will suffer from water hammering and will have a shortened life. On vertical air flow applications, the coils must be pitched when installed.
4. 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.
5. It is recommended that vacuum breakers be installed 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.
6. Do not drip supply mains through the coil.
7. Do not attempt to lift condensate when using modulating or on-off control.
8. Do not reduce the pipe size leaving the coil.

Traps:

1. Size traps in accordance with the manufacturer's recommendations. Be certain that the required pressure differential will always be available. DO NOT UNDERSIZE.
2. Float and thermostatic or bucket traps are recommended for low pressure steam. On high pressure systems, bucket traps are normally recommended. The thermostatic traps should be used only for air venting.
3. Bucket traps are recommended for use with on-off control only.
4. Locate traps at least 12 inches below the coil return connection.

Controls:

1. On high pressure installations, a two-position steam valve with a face and bypass arrangement is preferred where modulating control is required.
2. Modulating valves must be size properly. DO NOT UNDERSIZE.

Freezing Conditions (Entering air below 35°F):

1. 5 PSI steam must be supplied to the coil at all times.
2. Provision should always be made to thoroughly mix fresh air and return air before it enters the coil on return air units. Also, temperature control elements must be properly located to obtain true air mixture temperatures.
3. As additional protection against freeze-up, the trap should be installed sufficiently far below the coil to provide an adequate hydrostatic head to ensure removal of condensate during an interruption in the steam pressure. Estimate 3 feet for each 1 PSI of trap differential required.
4. On start up, admit steam to coil ten minutes before admitting outdoor air.
5. Provision must be made to close fresh air dampers if steam supply pressure falls below minimum specified.

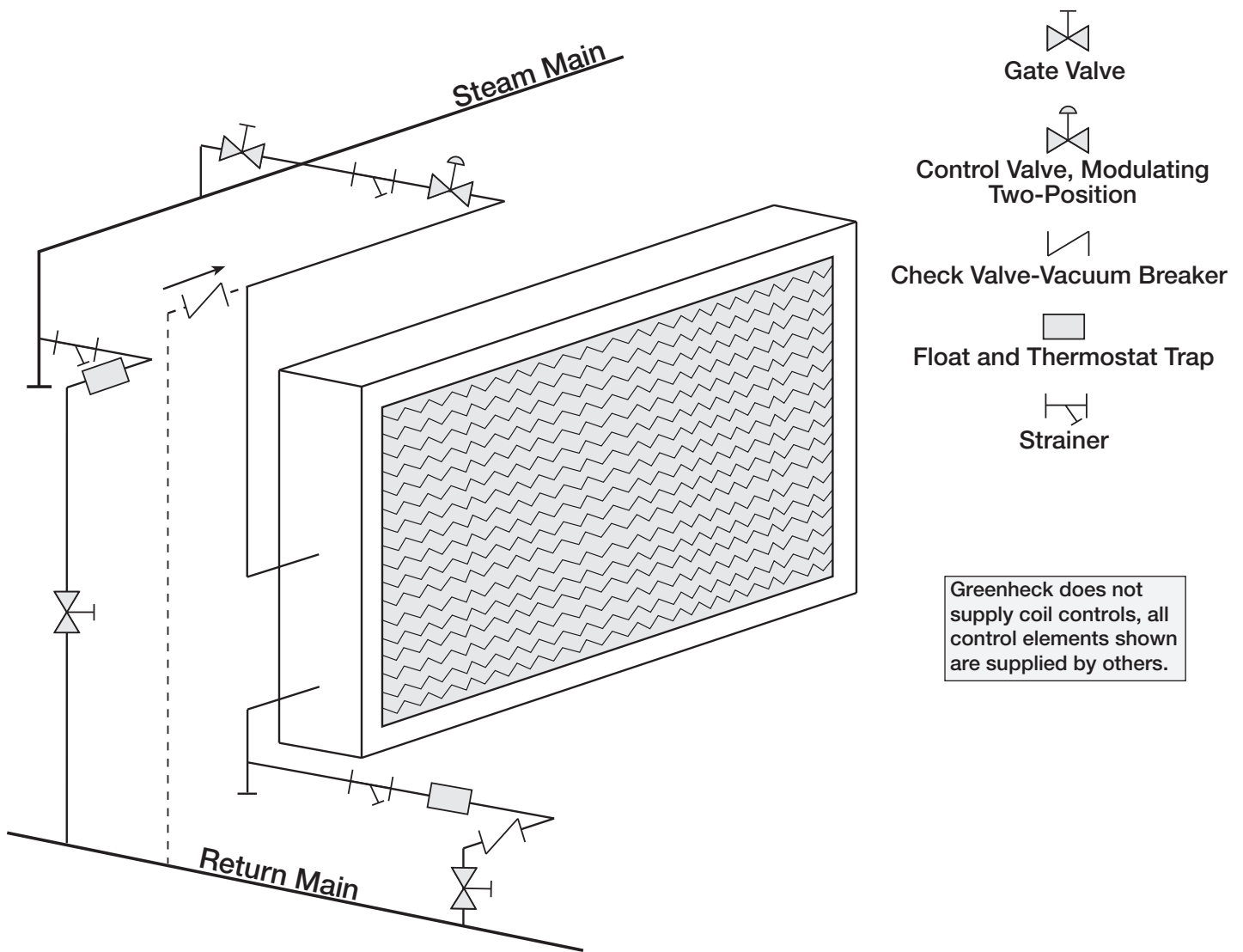


Figure 1
Recommended Steam Coil Piping

Direct Expansion Coils

Application Recommendations:

1. Piping should be in accordance with accepted industry standards.
2. The condensate drain pipe should be sized adequately to ensure the condensate drains properly. The bottom of the drain pan should be twice the distance of the internal static pressure water column above the exit of the trap.
3. When connecting suction and liquid connections make sure the coil is free from all foreign material. Make sure all joints are tight and free of leakage.
4. Greenheck does not supply compressor or condensing units, for further instruction on DX coil installation and operation contact your compressor and/or condenser manufacturer.

Water Coils

Application Recommendations:

1. Piping should be in accordance with accepted industry standards.
2. Connect the WATER SUPPLY TO THE BOTTOM CONNECTION on the air leaving side and the WATER RETURN TO THE TOP CONNECTION on the air entering side. The extra bottom connection can be used for an auxiliary manual drain connection, and the extra top connection can be used for an automatic air vent or the extra connections can be capped. Connecting the supply and/or return in any other manner will result in very poor performance.
3. The air vent at the uppermost point should be temporarily opened during system start-up to release all of the air from the coil. To maintain heat transfer capacity, periodically vent any air in coil.
4. Water coils are not normally recommended for use with entering air temperatures below 40°F; however, special high pressure water coils have been used successfully on high temperature hot water jobs with low entering air temperatures when correctly controlled. No control system can be depended on to be 100% safe against freeze-up with water coils. Glycol solutions or brines are the only safe media for operation of water coils with low entering air conditions.
5. When fresh and return air are to be heated by a hot water coil, care should be used in the design of the duct work to ensure thorough mixing before the air enters the coil. The return air should always enter the bottom of the duct and the fresh air should enter the top of the duct. The greater the distance between the mixing point and the entrance to the coil, the better the application. Temperature control elements should be located to sense the lowest temperature air that will enter the coil. Always install gasketed fresh air dampers which are automatically controlled to close whenever the water leaving the coil is too cool, or the fan stops. Care should be used in designing fresh air intake to prevent stack effect (or wind) from forcing cold air through the coils when the fan is shut down. Two sets of dampers are frequently required. CONTINUOUS WATER CIRCULATION THROUGH THE COIL AT ALL TIMES IS HIGHLY RECOMMENDED.
6. Pipe sizes for the system must be selected on the basis of the head (pressure) available from the circulation pump. The velocity should not exceed 8 feet per second and the friction loss should be approximately 3 feet of water column per 100 feet of pipe.
7. For chilled water coils, the condensate drain pipe should be sized adequately to ensure the condensate drains properly.

Coil Maintenance

Filters:

Filters upstream of the coil should be checked regularly for dirtiness and clogging. If the filters are dirty, they should be cleaned or replaced. It is important that the coils stay clean to maintain maximum heat transfer capability.

WARNING: Biological Hazard! All drain pans and coils should be cleaned on a regular schedule by qualified personnel to prevent the growth of bacteria.

Cleaning:

1. Coils must be clean to obtain maximum performance. Soiled fins reduce the capacity of the coil, demand more energy from the fan, and create a medium for mold and bacteria to grow and spread through the conditioned zone. High pressure water (700 Psi or less) may be used to clean coils with fin thickness over .0095 inches thick. TEST THE SPRAY PRESSURE over a small corner of the coil to determine if the fins will withstand the spray pressure. For coils with fragile fins or high fin density, foaming chemical sprays and washes are available. Many coil cleaners contain harsh chemicals, so they must be used with caution by qualified personnel only. Care must be taken not to damage the coils. FINS ARE SHARP! Use caution when working with coils.
2. Drain pans in any air conditioning unit will contain moisture; therefore, algae and other organisms will grow due to airborne spores and bacteria. Scheduled cleaning is necessary to prevent build-up from clogging the drain. The drain pans should also be kept clean to prevent growth of bacteria and the spread of disease.

Winterizing Coils:

During any extended down time, all water should be drained from the coil. The coil should then be thoroughly flushed with a glycol solution to prevent freeze damage.

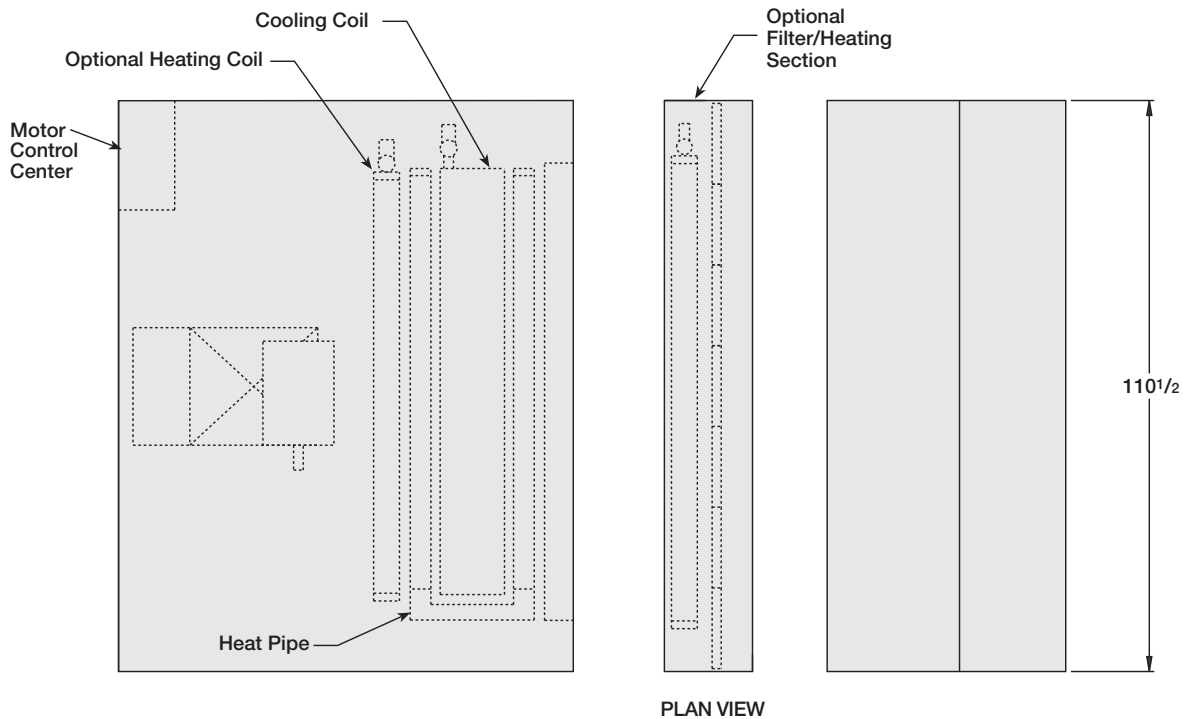
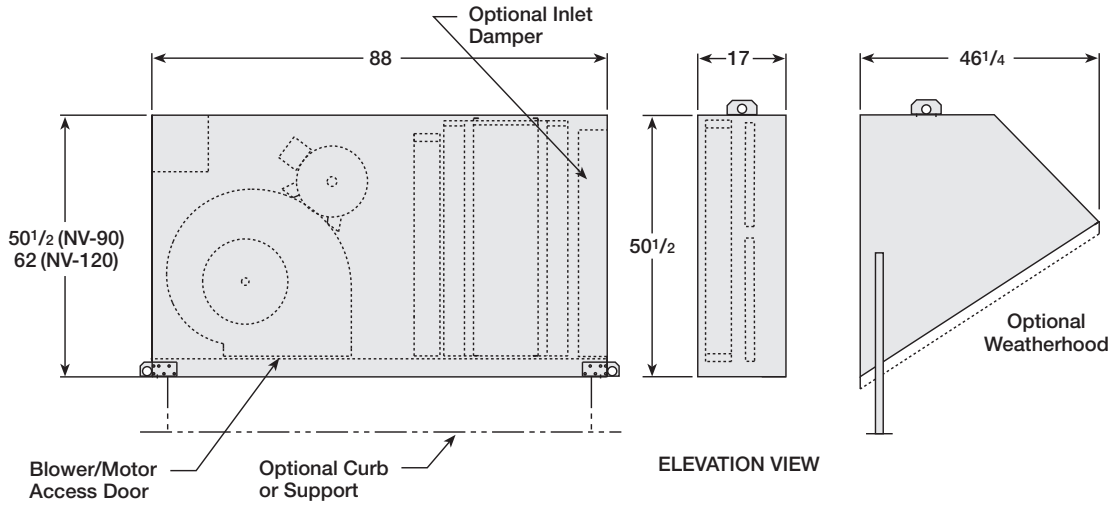
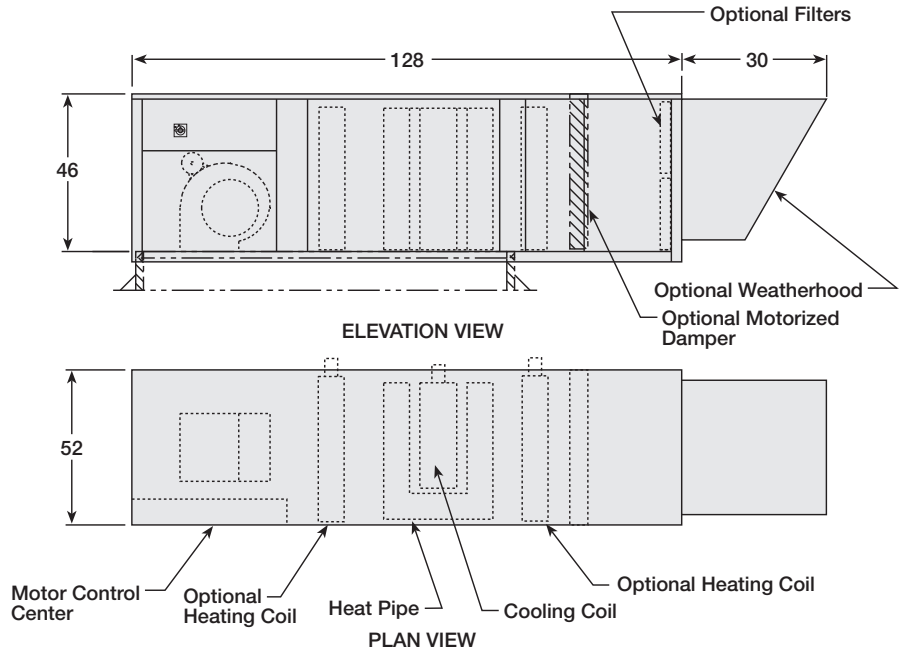
TROUBLE SHOOTING

Blower Unit

Symptom	Possible Cause	Corrective Action
Blower fails to operate	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker and check amps
	Broken fan belt	Replace
	Defective motor or capacitor	Replace
	Motor starter overloaded	Reset starter and check amps
Motor overamps	CFMs too high	Check CFMs and adjust drives if needed
	Static pressures are higher or lower than design	If higher, ductwork should be improved If lower, fan RPMs should be lower
	Blower rotation is incorrect	Check rotation and correct
	Motor voltage incorrect	Check motor nameplate and supplied voltage
	Motor horsepower too low	See specifications and catalog for fan curves to determine if horsepower is sufficient.
	Shorted windings in motor	Replace motor.
Insufficient airflow	Unit damper not fully open	Adjust damper linkage or replace damper motor
	System static pressure too high	Improve ductwork to eliminate losses using good duct practices
	Blower speed too low	Check for correct drives and RPMs with catalog data
	Dampers or registers closed.	Open and adjust
	Dirty or clogged filters	Clean or replace
	Leaks in ductwork.	Repair
	Elbows, or other obstructions may restrict fan outlet.	Correct or improve ductwork
	Belt slippage	Adjust belt tension
Too much airflow	Blower fan speed too high	Check for correct fan RPM
	Filter(s) not in place.	Install filters
	Insufficient static pressure (SP) (airflow resistance)	Induce SP into system ductwork.
Excessive noise or vibration	Wheel rubbing on housing	Center wheel
	Loose wheel on shaft	Tighten wheel setscrew
	Loose motor or blower sheave	Tighten sheave setscrew
	Belts too loose	Adjust belt tension after 24 hours of operation
	Belts too tight	Loosen to maintain 3/8" deflection per ft. of span between sheaves
	Worn belt	Replace
	Motor base or blower loose	Tighten mountings bolts
	Worn bearings	Replace
	Bearing and drive alignment	Realign
	Motor out of balance	Replace
	Wheel out of balance	Replace or rebalance
	Sheaves eccentric or out of balance	Replace or rebalance
	Accumulation of material on wheel	Clean wheel and housing

General Dimensions and Weights

NV-45	1680 lbs
NV-45 w/Heating Coil	1780 lbs
NV-90	2650 lbs
NV-120	3150 lbs
NV-90 w/Heating Coil	2870 lbs
NV-120 w/Heating Coil	3370 lbs
NV-90/120 Weatherhood	250 lbs
NV-90/120 Filter Section	200 lbs
NV-90/120 Filter Section w/Coil	420 lbs



Maintenance

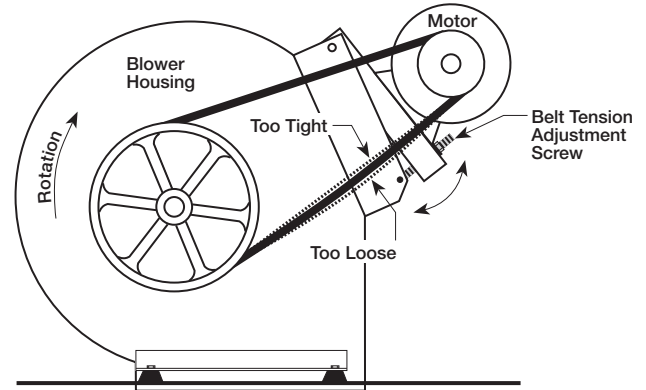
Greenheck recommends these procedures to insure trouble free operation of this unit. Most unit failures can be attributed to poor setup or poor maintenance.

A record of maintenance performed on this unit should be kept. This information will provide essential information if problems are encountered. A section at the back of this manual is provided for recording the unit's maintenance history.

CAUTION: When performing any maintenance on this unit be sure that the power is disconnected and cannot be accidentally turned on. The control center disconnect can be locked in the off position .

2 weeks after startup

Check belt tension - Belts tend to stretch after a period of time. They should be periodically checked for wear and tightness. **Approximately 3/8" of deflection per ft. of span between sheaves is standard for belt tightness.** When replacing belts, use the same type as supplied with the unit. Matched belts should always be used on units with multigroove pulleys.



NOTE: For motors of 1 HP or less a smaller sliding base bracket is used to attach to blower.

Replacement of belts - should be accomplished by loosening the tensioning device to the point where the belts can be removed by hand. Do not force belts on or off as this may cause breakage of cords leading to premature belt failure. Belts should be adjusted as shown above.

Every 3 Months

The filter in the unit should be inspected at least every 3 months. Depending on the environment filters could require changing or cleaning more or less often. The filters can be slid out of either side of the unit.

If **washable filters** are installed, they can be washed in warm soapy water. An adhesive spray can be applied to increase filter efficiency.

If **disposable filters** are installed, check by holding up to a light source. If light cannot pass through the filter, it should be replaced. Replacement filters should be of the same manufacturer and size.

When reinstalling filters, be sure to install with the airflow in the correct direction indicated on the filter and with any factory spacers that came with the unit.

Yearly

All **bearings** on units 108 to 118 are permanently lubricated and require no further lubrication under normal use. Normal use being considered -20°F to 120°F and in a relatively clean environment. Units from sizes 120 to 220 should be checked monthly for lubrication.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to the exterior surfaces only. Removing dust and grease buildup on motor housing assures proper motor cooling. Greasing of motors is intended only when grease fittings are provided. Many fractional motors are permanently lubricated and require no further lubrication. Motors supplied with grease fittings should be greased in accordance with manufacturer's recommendations. When motor temperature does not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally oil and dust may accumulate on the wheel causing imbalance. When this occurs the wheel and housing should be cleaned to assure smooth and safe operation.

Routinely check all **fasteners** for tightness.

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