

CLEANPAK™ AHU

INCLUDING:

CLEAN-PAK® RECIRCULATION AIR HANDLERS

CLEAN-PAK® MAKE-UP AIR HANDLERS

CLEAN-PAK® AIR HANDLERS

INSTALLATION & OPERATION MANUAL



Products may be protected by one or more of the following US patents: 5,613,759; 5,794,397; 5,014,608; 5,161,941; 5,088,886; 5,192,348; 5,207,614; 5,454,756; 5,586,861; 5,628,581; 5,681,143. Patents pending. All rights reserved.

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GENERAL

The information in this application booklet is provided as a guideline for the installer. It is the installer's responsibility to ensure proper installation, safety and adherence to the specifications as the owner or structural engineer outlines them. Do not alter CLEANPAK™ products without prior written approval from CLEANPAK International. CLEANPAK is not responsible for any unauthorized bracing or loading to the systems. The statements and diagrams contained herein are non-specific and do not necessarily reflect actual projects.

Safety

- A. The installer is responsible for providing qualified, trained personnel to install and operate the equipment. Consult all local building, occupational safety, electrical, gas and other codes applicable to the installation. Safety considerations include, but are not limited to, the accessibility of the equipment to non-service personnel, the provision of electrical switches and maintenance procedures.
- B. This manual has been prepared for the installer and operator of CLEANPAK equipment. Due to the custom nature of CLEANPAK products, there may be areas beyond the scope of this manual. If there are any questions about a special application lacking coverage, please contact CLEANPAK International's Service Department.
- C. The customer is responsible for providing qualified and trained personnel to install and operate the Clean-Pak equipment. Never open an access door while the unit is in operation. Consult all local building, occupational safety, electrical, gas and other codes applicable to the installation. Safety considerations include, but are not limited to:
 - a. The accessibility of the equipment to non-service personnel
 - b. The provision of electrical lockout switches
 - c. Maintenance procedures
 - d. Automatic control sequences
 - e. Equipment wired to automatic control devices may start without warning, resulting in personal injury or property damage. In many instances, a unit will have multiple electrical and compressed-air connection points. To prevent unforeseen start-up, always lockout all power supplies prior to beginning work on a Clean-Pak unit in accordance with the electrical safety guidelines. A fan, even though locked out electrically, can rotate in a seemingly insignificant airflow. The impeller should be secured during maintenance to restrict rotation, making sure that the restrictive device is removed before putting the fan back into service.
 - f. Always replace any protective covers removed for servicing.
 - g. Always lock or replace bolt on access door for doors that provide access to moving parts.

Service and Warranty

For service on CLEANPAK products, contact:
CLEANPAK International
Service Department
11241 S.E. Highway 212
Clackamas, Oregon 97015
Phone: 503.557.4500 Fax: 503.557.4501
Refer to Limited Warranty at the end of this document.

Receiving and Inspection

- A. CLEANPAK's cleanroom products are double-wrapped in the factory. Ship-loose hardware is not wrapped unless otherwise specified.
- B. Carefully inspect all parts after receiving them from the transporting agent. Since CLEANPAK cleanroom products are pre-cleaned and then wrapped, do not unwrap them outdoors or in a dirty environment. Components should be unwrapped in a clean area and the receiver is responsible for inspecting for damage.
- C. Some ship loose items may be supplied with the units. These may include nuts, bolts and caulking for split assembly, extra fan belts, lifting lugs, filters, filter clips.
- D. Compare parts with the shipping documentation to make sure your shipment is correct, free of damage and complete. Your signature verifies that you have received all equipment in satisfactory condition.
- E. If shipping damage has occurred, notify the freight carrier and CLEANPAK International's Service Department immediately. Provide photographs of the damaged freight and call the freight claims inspector to inspect the damage and submit a damage report. After the claims inspector has released the shipment, perform a 100% inspection of the product. Isolate damaged equipment in a separate holding area to prevent it from being installed.

Storage

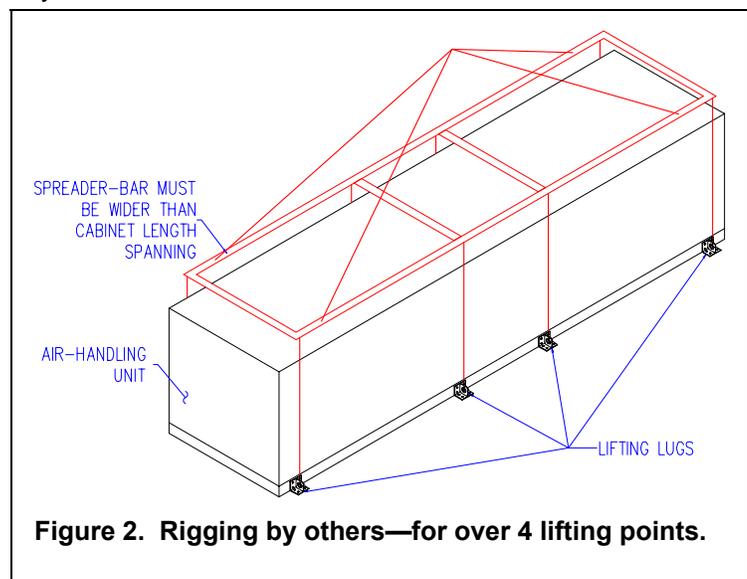
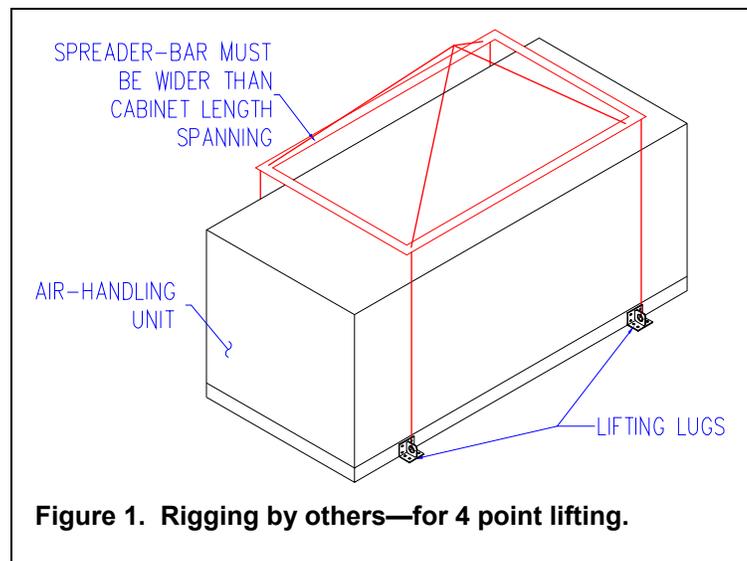
- A. Cleanroom units must be stored indoors, never outdoors.
- B. Store units designed for the outdoors unit in dry, protected areas, preferably indoors being sure that the internal components are protected against dust and corrosion. Take special care to prevent moisture, corrosion, and dust or dirt accumulation. Use tarps or weatherproof covers to protect the exterior of the cabinet. This will prevent the weather from entering through louver and openings. Always keep all access door closed.
- C. Protect the units from excessive vibration and accidental impact. Do not store other equipment on top of or inside the unit. During extended storage periods, manually rotate the fan wheels periodically and follow motor manufacturer's instructions to avoid bearing damage.

Clearances

- A. Check location and clearances between the Clean-Pak[®] unit and adjacent object. The national electrical code (NEC or CEC) requires a minimum of working clearances between the face of any electrical enclosure and any wall or obstruction.
- B. Be sure there is sufficient clearance to open doors as well as install piping and ducting. There must be no obstruction to prevent airflow through the hoods or louvers. Allow a distance equal to the horizontal width of the louver between the louver and any wall facing the louver.
- C. Allow sufficient space around the unit for removing access panels and other components. A minimum clearance equal to the width of the unit should be provided on one side of the unit for removing items such as coils, fan wheels and motors.

Lifting and Handling Requirements

- A. The unit may ship as already assembled, as a subassembly (collection of sections) or as individual sections.
- B. Units are factory pre-cleaned prior to shipment. Do not unwrap Clean-Pak units outside after being unloaded from the truck or store in unprotected or high-traffic areas. CLEANPAK recommends that units be stored in a controlled environment when delivered to jobsites in variable or humid climates. Visually inspect plastic wrapping daily to insure that no condensation has formed inside wrap and any rips in plastic have been sealed.
- C. Examine equipment carefully before lifting to determine if there are split points. **Do not lift multiple sections at the same time**, as they are not designed to support a moment at the split point. Sometimes, split unit sections may be shipped bolted together to reduce shipping costs. These sections must be disassembled and lifted individually.
- D. To prepare for lifting the Clean-Pak units, estimate the approximate center of gravity. Internal placement of components may cause the weight to be unevenly distributed with more weight in the coil and fan areas. The factory lifting lugs are provided to raise the unit. Spreader bars are required to prevent damage to the cabinet and protruding components during a lift.
- E. Use all lifting lugs on the base channels. Adjust the tension in each



line for proper load distribution. (See Figure 1 and Figure 2 for recommended lifting of Clean-Pak units.)

- F. Do not lift non-base units or subassemblies by attaching clevis, hooks, pins, bolts, etc. to casing, casing hardware, angles, tabs or flanges. Rig non-base units only as shown in Figure 3.
- G. It may be possible to tow units with 40" forklift forks, providing the end tips of the forks contact the bottom of the intermediate supports of the base rail. A forklift may be used for lifting single sections or small subassemblies, providing the forks support both ends of the base rail. (See Figure 4 for towing base rail units and subassembly guidelines.) Exercise caution when using forklifts to prevent damage to the unit.
- H. Lift the Clean-Pak unit only in an upright position. Never lift or move a unit on its side or upside-down. If you do not rig or lift the unit carefully, you could hurt yourself or damage the unit.

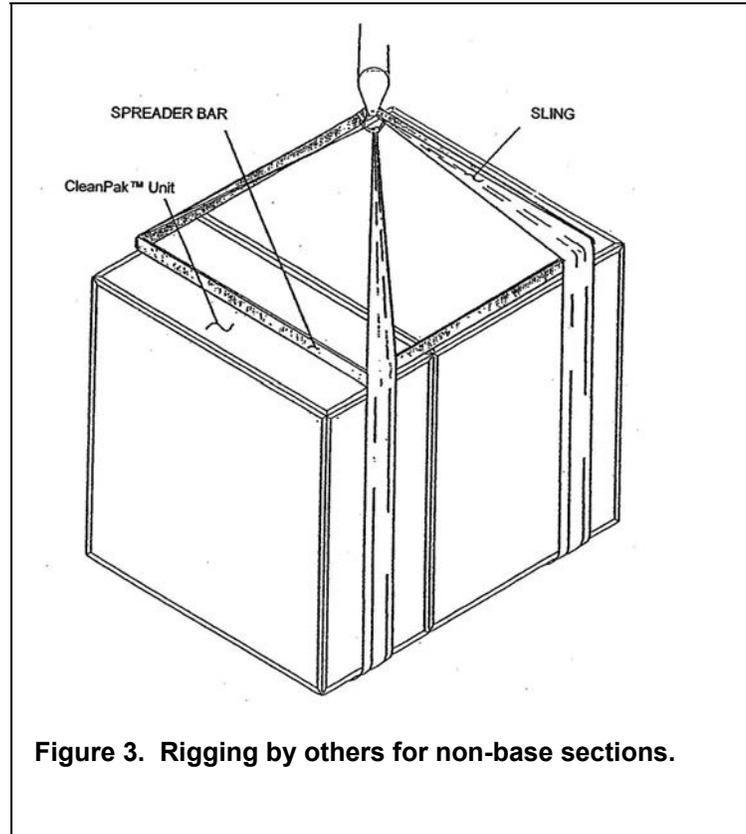


Figure 3. Rigging by others for non-base sections.

Location Considerations

- A. The floor, foundation, housekeeping pad or curb on which the units are to be located should be rigid and level (shim as required). The structure should be capable of supporting the weight of the unit, including all components (including water or refrigerant within the coils), plus the load imposed by the rotating fans. The installer is responsible for securing the unit to the housekeeping pad in accordance with applicable building and seismic codes.
- B. Ceiling suspended units are designed to be supported from the welded base. Use all suspension points pointed out in the submittal. The casing is not intended to support the unit. The installer is responsible for hanging and bracing the unit to the structure in accordance with applicable building and seismic codes.

Split Assembly

- A. Disassembled Clean-Pak units for shipment/handling must be reassembled at the jobsite. Adequate supplies of nuts, bolts and caulking

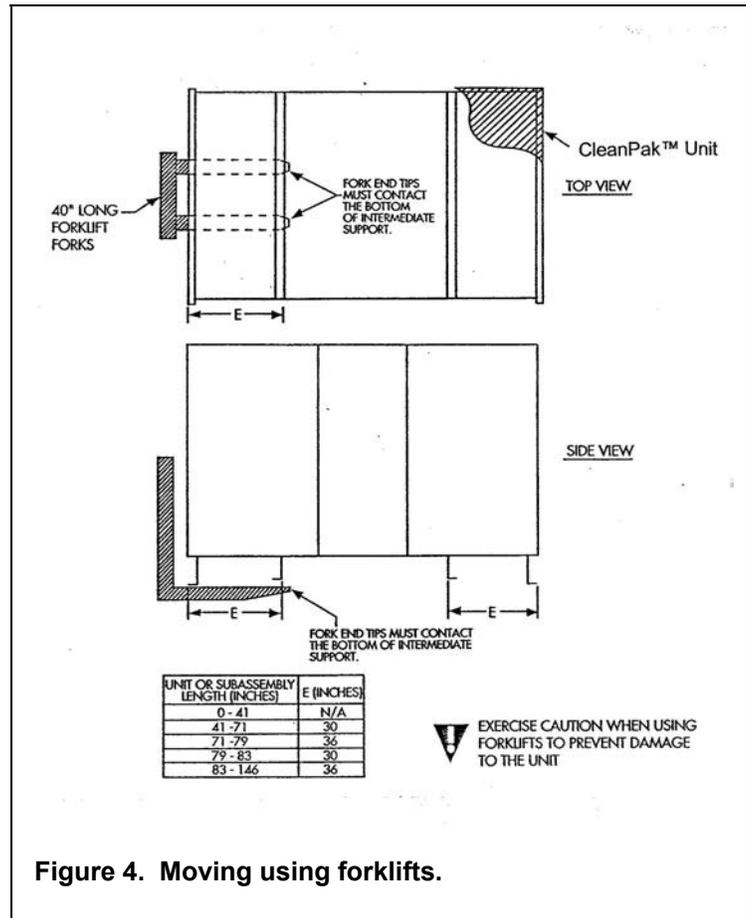


Figure 4. Moving using forklifts.

UNIT OR SUBASSEMBLY LENGTH (INCHES)	E (INCHES)
0 - 41	N/A
41 - 71	30
71 - 79	36
79 - 83	30
83 - 146	36

EXERCISE CAUTION WHEN USING FORKLIFTS TO PREVENT DAMAGE TO THE UNIT

have been supplied for proper reassembly. Insure that all seams are caulked before and after assembly.

- B. Caulk all panel joints prior to assembly and again after bolting together. For outdoor units, caulk and bolt roof panel joints and then caulk and install caps over the roof joints.
- C. It is the installer's responsibility to connect all internal and external electrical or piping splits. Perform all necessary safety checks prior to energizing the electrical circuits.
- D. It is the installing contractor's responsibility to ensure that adequate controls exist on dampers so that the dampers do not shut (either intentionally or accidentally) while the fan is running. This could lead to over-pressurization of the unit cabinet and damage to components and/or the unit cabinet.

Condensate Drain Trap Sizing

- A. All condensate drain connections and floor drains must be trapped at the jobsite location by the installer. Failure to properly trap a drain may result in flooding and potential damage to the air handler and other building facilities.

Fan Hold-downs, Spring Isolators, and Econo-Disk

- A. After fan is placed in final location, all fan shipping tie-downs (four per fan assembly), must be removed and the seismic restraints set up according to instructions on the fan frame. Verify that fan is standing free on the spring isolators and that no obstructions impair the isolation. Check flexible connection between fan assembly and between the intake wall. Make sure the flexible conduit to the motor and the bearing lubrication lines do not restrict the isolation.
- B. Visually inspect fan wheel for any damage or obstructions and rotate the wheel by hand to be sure it is spinning freely.
- C. Check variable volume devices (Econo-Disk®, dampers, etc.) to insure smooth operation and no binding. Check to see that actuators and linkage are mounted without obstructing the fan operation or short circuiting isolation. Actuators should be hand operated through their entire cycle to confirm proper alignment and avoid over-torque of mechanisms, which can cause damage.

Preliminary Cleaning

- A. Vacuum and clean unit of all foreign objects.
- B. For cleanroom units, do a preliminary wipe down using a 10:1 solution of deionized water and isopropyl alcohol.

Fan start-up

- A. Refer to manufacturer's start-up instructions for fan units using variable frequency drives.
- B. Prior to starting fan, insure that wiring is correct (wire size, voltage and connections should be verified).
Overload device(s) should be inspected to make sure

that the correct thermal elements are installed. The initial fan test run should include a “bump start” to verify correct rotation (rotation direction is indicated on motor). Any unusual mechanical noises or wiring problems should be investigated and corrected before performing a full speed test.

- C. During the full speed test, check all motors with an amp meter and compare reading with motor rating. Do not run equipment in overload condition. The fan has been factory vibration tested, but visual inspection during the full speed test will determine if any vibration problems exist. The fan thrust springs are designed to compensate for fan thrust away from the discharge. On plug fans, adjust fan base spring clips closest to the fan wall so they do not bottom out.

Final Cleaning

- A. For cleanroom units, perform final cleanroom-approved wipe down using a 10:1 solution of deionized water and isopropyl alcohol. Do not use this solution on plastic.

Maintenance

- A. For components requiring maintenance, follow the maintenance instructions from the original equipment manufacturers' manuals.
- B. Components such as shaft grounding devices for motors from Shaft Grounding Systems or Mercotac require routine checking of their effectiveness (checking continuity) and this should be performed on a maintenance schedule (suggested every 6 months).
- C. Electrical panels should be under a routine maintenance plan for checking of integrity of connections.

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LIMITED WARRANTY -- Standard CLEANPAK International, Inc. ("Company") Warranty

Company warrants that on the date the equipment is delivered by the Company to the carrier for shipment to the Purchaser that the equipment will be of the kind and quality described in the initial contract, bid, purchase order or other solicitation (the "Order"), and free from defects in workmanship and materials.

If within the earlier of (i) 12 months from date of first operation or (ii) 18 months from the date the first item of equipment is delivered by the Company to the carrier for shipment to Purchaser (the "Warranty Period"), Purchaser discovers that such equipment was not as warranted above and notifies Company in writing thereof promptly and in any event prior to the last day of the Warranty Period, then Company shall remedy such defect by, at Company's option, adjustment, repair or replacement of the item and any affected part of the equipment. Purchaser assumes all responsibility and expense for removal, reinstallation and freight charges (both for return and delivery of new parts) in connection with the foregoing remedy. The same obligations and conditions shall apply to replacement items furnished by Company pursuant to this warranty. Company shall have the right to dispose of items replaced by it. Purchaser shall grant Company access to the premises at which the equipment is located at all reasonable times so that Company can evaluate any defect in the equipment and make any repairs or replacements it may choose to make on-site. If adjustment, repair or replacement does not remedy the defect, Company and Purchaser shall negotiate in good faith an equitable adjustment in contract price; although any such adjustment shall (i) not exceed the purchase price for the defective equipment (ii) not include incidental or consequential damages (iii) not include costs for removal, reinstallation or freight, all in accordance with CLEANPAK International Standard Terms and Conditions of Sale. If Company and Purchaser are unable to agree upon an equitable adjustment, then such adjustment shall be determined by binding arbitration in accordance with the Oregon Arbitration Rules of the American Arbitration Association. Any arbitration proceeding shall occur in Clackamas County, Oregon.

Company's responsibility does not extend to any item of the equipment that was not manufactured and sold by Company ("Out-Sourced Items"). Out-Sourced Items shall be covered only by the express warranty, if any, of the manufacturer thereof and Company hereby expressly disclaims any and all warranties, whether express or implied, including the warranties of merchantability and fitness for a particular purpose, with respect to Out-Sourced Items.

Neither Company nor the suppliers of Out-Sourced Items shall have any responsibility or liability if (i) the equipment has been improperly stored, handled or installed, (ii) the equipment was not operated or maintained according to its ratings and/or according to instructions in Company and/or supplier furnished manuals, (iii) unauthorized repairs or modifications have been made to the equipment, or (iv) the equipment is used in a manner that exceeds design specifications.

No liability under this warranty shall exist unless the following conditions are met:

1. The initial startup and checkout must be performed in accordance with Company instructions.
2. Company must be given the opportunity to make modifications to the equipment at any time during the Warranty Period, as long as said modifications do not interfere with the intended purpose of the equipment.

This warranty, if activated, does not cover the following terms:

1. Labor, travel time and expense incurred at any time after the initial startup of the equipment.
2. Any and all items of a housekeeping and/or maintenance type required for the proper operation of the equipment.
3. Any causes outside the control of Company, such as fires, explosions, negligence or intentional acts of any party or parties and acts of God.

During the Warranty Period, if replacement parts are deemed justified, then Purchaser must submit a formal purchase order and Purchaser will be invoiced for the parts so ordered. Company will issue credit on that invoice upon receipt by Company of the replaced part(s).

This warranty shall not be construed as providing Purchaser an avenue to assess liquidated, incidental or consequential damages that arise from an actual or perceived defect in the equipment.

THIS WARRANTY IS PURCHASER'S SOLE REMEDY AND IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES (EXCEPT TITLE), INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND CONSTITUTES THE ONLY WARRANTY OF CLEANPAK INTERNATIONAL, INC. WITH RESPECT TO THE EQUIPMENT.

The foregoing states Purchaser's exclusive remedy against Company and the supplier for any defects in the equipment or for failure of the equipment to be as warranted, whether Purchaser's remedy is based on (i) contract, (ii) warranty, (iii) negligence with regard to recommendations regarding the equipment and installation advice or service related thereto, (iv) failure of such remedy to achieve its essential purpose, (v) tort (including negligence), (vi) strict liability, (vii) indemnity, or (viii) any other legal theory, and whether arising out of warranties, representations, instructions, installations or defects from any cause whatsoever.

Replacement Warranty

Should a replacement of a defective item be the solution to a warranty claim, the part shall be under warranty for the later of (i) the duration of the Warranty Period or (ii) ninety (90) days following the date the replacement equipment is delivered by the Company to the carrier for shipment to the Purchaser, whichever is longer (the "Extended Warranty Period").

A remanufactured part (other than original warranty replacement) carries a ninety- (90) day warranty only.

Second Party Warranties

If the equipment incorporates Out-Sourced Items purchased by Company for the purpose of incorporating in the equipment, the express warranty, if any, of the Out-Sourced Items manufacturer shall prevail. Such Out-Sourced Items will include, but not be limited to, electric motors, variable frequency drives (a.k.a., drives, VFD's, AFD's, VSD's), sprinkler heads, and high-purity air filters (a.k.a., HEPA or ULPA filters). If any of these Out-Sourced Items are not as warranted in the Out-Sourced Items manufacturer's warranty, Purchaser shall contact the appropriate party as specified by the Out-Sourced Items manufacturer's warranty, and make all necessary arrangements for adjustment, repair or replacement as indicated. Company shall in no way be held liable for any conditions or repercussions arising from a warranty claim that involves such Out-Sourced Items. This exclusion of liability includes that which is a result of a failure on the part of a Out-Sourced Items manufacturer to adjust, repair, or replace their equipment under the terms of its warranty. If the Out-Sourced Items manufacturer's warranty period expires prior to expiration of the Warranty Period (or Extended Warranty Period, as applicable), the Out-Sourced Items shall no longer be warranted.

Project Plans and Specifications

Company will assist Purchaser in developing equipment specifications for an Order by the preparation of quotations and submittals (collectively, the "Submittals"). Company provides Submittals for the sole purpose of showing additional detail to allow Purchaser to determine whether the equipment is suitable and appropriate for Purchaser's application. Regardless of any express or implied opinions of Company's salespersons and/or engineers, Purchaser shall have sole responsibility to ensure that the equipment (as detailed in the Submittals) complies with any project plans and specifications. The submission of an Order by Purchaser shall be deemed a warranty and agreement by Purchaser that the equipment so complies notwithstanding any contrary statements in the Order. If Company provides the equipment in accordance with the Purchaser-approved Submittals, Purchaser agrees to accept full and sole responsibility for any deviations from the project plans and specifications that later become apparent or evident.