



**ENGINEERED AIR**

**INSTALLATION, OPERATION  
AND MAINTENANCE MANUAL**

**FOR**

**HRRF SERIES**

**REVERSE FLOW ENERGY RECOVERY UNITS**

**INDOOR AND OUTDOOR MODELS**

UNIT MODEL NO. \_\_\_\_\_

UNIT SERIAL NO. \_\_\_\_\_

SERVICED BY: \_\_\_\_\_

TEL. NO: \_\_\_\_\_

**CANADIAN  
HEAD OFFICE  
AND FACTORY**

1401 HASTINGS CRES. SE  
CALGARY, ALBERTA  
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NEWMARKET, ONTARIO  
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**SALES OFFICES ACROSS CANADA AND USA**

Retain instructions with unit and maintain in a legible condition.  
Please give model number and serial number when contacting  
factory for information and/or parts.

[www.engineeredair.com](http://www.engineeredair.com)

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## YOU HAVE RESPONSIBILITIES TOO

This installation, operation and maintenance manual cannot cover every possibility, situation or eventuality. Regular service, cleaning and maintaining the equipment is necessary. If you are not capable of performing these tasks, hire a qualified service specialist. **Failure to perform these duties can cause property damage and/or harm to the building occupants and will void the manufacturers' warranty.**

## INTRODUCTION

Engineered Air units are high quality products designed and manufactured to provide many years of trouble-free operation. We recommend that this manual be read thoroughly to ensure proper installation, efficient operation and proper maintenance of this equipment. The submittal record is considered to be part of the Installation, Operation and Maintenance Manual. Please report any omissions to the national service manager.

## SAFETY PRECAUTIONS

Read, understand and follow the complete manual before beginning the installation, including all safety precautions and warnings.

It is recommended to wear heavy-duty gloves at all times while handling system components and packaged aluminum plates (cassettes).

This unit has a 3% cross contamination ratio. It should not be used in any unsafe applications.

**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.**

**Warning:**

**This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.**

## **WARRANTY**

**LIMITED WARRANTY** ENGINEERED AIR will furnish without charge, F.O.B. factory, freight collect, replacement parts for, or repairs to products covered herein which prove defective in material or workmanship under normal and proper use for a period of twelve (12) months from the initial start-up or eighteen (18) months from the date of shipment, whichever expires sooner, provided the customer gives ENGINEERED AIR written notice of such defects within such time periods and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full. The repairs or replacements will be made only when the complete product(s) or part(s) claimed to be defective are returned to ENGINEERED AIR or a depot designated by ENGINEERED AIR, transportation charges prepaid. Repairs or replacements as provided for by this paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. The refrigerant charge is not included in any part of this warranty. This warranty does not apply to any products or parts thereof that have been subject to accident, misuse or unauthorized alterations, or where ENGINEERED AIR's installation and service requirements have not been met.

The foregoing warranty is in lieu of all other warranties, express or implied. ENGINEERED AIR specifically disclaims any implied warranty of merchantability and/or fitness for purpose. Under no circumstances shall ENGINEERED AIR be liable to, nor be required to indemnify, Buyer or any third parties for any claims, losses, labour, expenses or damages (including special, indirect, incidental, or consequential damages) of any kind, resulting from the performance (or lack thereof) of this Agreement or the use of, or inability to use the goods sold hereunder, including, but not limited to, damages for delay, temporary heating/cooling costs, loss of goodwill, loss of profits or loss of use. Furthermore, the parties agree that the Buyer's sole remedy under this Agreement shall be limited to the limited warranty set forth in the preceding paragraph relating to the repair or replacement of any defective goods. Under no circumstances shall any claim or award against ENGINEERED AIR exceed the original contract price whether awarded through arbitration, litigation or otherwise.

ENGINEERED AIR Warranty is void if:

1. The unit is not installed in accordance with this manual.
2. The start-up and operation of the unit is not performed in accordance with this manual.
3. The unit is operated in an atmosphere containing corrosive substances.
4. The unit is allowed to operate during building construction.

## CODES

### In Canada:

1. The installation of this unit shall be in accordance with the latest edition of the Canadian Electrical Code, Part 1 – C.S.A. Standard C22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
2. This unit shall be electrically grounded in accordance with the latest edition of the Canadian Electrical Code, Part 1 – C.S.A. Standard C22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
3. The installation of this unit shall be in accordance with all other National, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.

### In USA:

1. The installation of this unit shall be in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
2. This unit shall be electrically grounded in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
3. If the unit has not been provided with an electric disconnect switch, one of adequate ampacity shall be installed in accordance with Article 430 of the National Electrical Code (ANSI/NFPA 70).
4. The installation of this unit *shall* be in accordance with all other National, State and Local Codes, and in accordance with the local authorities having jurisdiction.

## MINIMUM CLEARANCE FOR SERVICE

MODEL	SERVICE CLEARANCE (mm)	
	SERVICE SIDE	CONTROL PANEL †
HRRF	36" (915)	42" (1067)

† - As required by the Canadian Electrical Code or the National Electrical Code.  
For Safety and Service, the minimum clearances must be observed.

While installing the unit, clearances should be left for proper ventilation and access to the system. The open end of the cassettes where air enters or exhausts should have a minimum of 2 meters (6 feet) of clearance to allow for intake and exhaust room. This also assures ample room to pull the cassettes out for cleaning and maintenance purposes. Above the damper control section, 1 meter (3 feet) of clearance is recommended to provide access to the controls. This also pertains if the damper is mounted vertically. Also allow sufficient room for door swings and coil pull on sides of unit, if so equipped.

## PARTS

**Warning:** Any replacement part must be of equivalent listing or certification and be functionally equivalent. The replacement part must meet the original's specification in terms of functionality including certifications, timing, input and output range, accuracy and operation.

 Failure to replace parts or components with equivalent parts can cause property damage, injury or death.

Contact the nearest Engineered Air sales office or factory. Be sure to include Model Number, Serial Number, date of installation and nature of failure along with the description of the parts required. Some parts may not be stocked items that must be made or ordered.

## RECEIVING

Refer to the back of the packing slip for receiving unit instructions.

On receipt of the unit, check for damage. Inspect protective covers for punctures or other signs that there may be internal damage. Remove protective covers and check for internal damage. Replace covers if the unit is not being assembled or installed at this time. Open access doors and check for internal damage. Close access doors when the inspection is complete. If damage is found follow the instructions on the packing slip.

On receipt of the unit, check electrical characteristics (see rating plate) to make sure the unit voltage is compatible with that available.

Equipment typically ships in four sections:

- (2) cassette housings with interconnecting duct,
- (1) damper section with controls, and
- (1) individual cassettes on pallet. Engineering drawings will specify number of components in shipment.

All parts for field installation are listed on the shipping order form.

Units are normally shipped either skidded for handling with a forklift, or with either fixed or removable lifting lugs.

## TEMPORARY STORAGE

If units need to be stored for any reason site storage should ideally be in a dry, indoor area protected from damage by traffic or surrounding construction activities. If a unit is to be stored outdoors prior to installation the following precautions are required:

- Store in a well drained area that will not accumulate surface water.

- Store in an area where the unit will not get damaged.
- The entire perimeter and any full height cross members of the unit must be supported by a level surface and the supporting surface must be adequate for supporting the entire weight of the unit.
- All protective coverings that were provided for shipping must be in place.
- Protect indoor rated appliances from rain and snow.
- Any access doors or panels, which may have been opened during inspection procedure, should be resealed.

## **MOUNTING**

Units must be mounted level. Failure to do so can cause water to be trapped in drain pans or operational problems that can void warranty. Failure to do so can result in injury or death, damage the equipment and/or building and can be a cause of poor indoor air quality.

Equipment must be installed so that sufficient working clearance and component access is provided. Some units are designed for cantilevered installation. Consult the Submittal Record for specific unit mounting.

Consult the Submittal Record for specific unit mounting. Engineered Air units are constructed for three types of mounting:

1. Base mounting – Consult the Submittal Record for type of mounting. Unless the unit is specifically designed for point or other mounting, the base of the unit must be supported continuously by a mounting support system that is directly below the unit structural base frame and runs the entire length and width of the unit. Refer to the Submittal Record for mounting information. Units 100” (2500mm) wide and under can be supported on each side continuously along the length of the unit. As a minimum, sleepers that are installed perpendicular to the length of the unit must be continuous across the width of the unit and shall be installed at the end lifting point base rails and the lesser of 80” (2000mm) on center or at all lifting points.
2. Suspended mounting – Where units have been designed for suspended mounting, factory provided connections for hanger rods will be provided. All hanger rod supports must be used. Suspended units must be protected from damage. When installed in aircraft hangers, parking garages or repair garages the installation must comply where applicable with:
  - a) The Standard on Aircraft Hangers, ANSI/NFPA 409
  - b) The Standard on Parking Garages, ANSI/NFPA 88A
  - c) The Standard on Repair Garages, ANSI/NFPA 88B
3. Roof curb mounting – The curbs are constructed of heavy gauge load bearing, galvanized steel, and must be fully insulated after installation. Wood nailer strips are provided for easy attachment of roof flashing. Gasket material is supplied with the unit and must be field mounted on the curb to seal the joint between the curb and the unit frame. The curb must be supported along its entire perimeter and any full height cross members as shown on the shop drawings. Point loading of curbs is not permissible.

The gasket material provided for the curb is closed cell foam. Closed cell foam is dense and does not

compress easily. If the unit is split and shipped in sections there will also be gasket material for sealing between sections. The gasket material for splits is open cell foam. It is less dense than the closed cell foam and compresses easily.

ONLY USE THE CLOSED CELL FOAM GASKET PROVIDED FOR SEALING THE CURB.

Curbs may be broken down for shipping. Field assembly is required by the installing contractor. Bolt all sections together at split joints using hardware provided. The installing contractor must caulk and seal all joint and corner flashings. All flashings and braces that are provided must be installed. DO NOT screw/penetrate joint, corner or adaptor flashings. Refer to assembly instructions sent with roof curb.

## INSTALLATION

**Note:** Installation shall be in accordance with this manual and all other associated component and control Installation, Operation and Maintenance Manuals.

**Warning:**



This unit is not rated for hazardous locations and cannot be installed in areas requiring any hazardous location rating.

**Caution:**



All wiring and piping installation must be completed by qualified persons in accordance with all federal, state, provincial and/or local codes.

**Caution:**



When sections are lifted by crane, or helicopter, with a single point rig, a proper lifting system with spreader bars must be provided to protect against racking the unit or crushing the unit's sidewalls. Units must be lifted vertically and level. Twisting, racking, or pounding the unit can break seals and even shift or distort the casing's panels and/or internal components.

**Caution:**



At no time during installation should the units be moved using the cassette louvers as lifting points or as handles, as damage may occur.

For both indoor and outdoor applications, the unit must be mounted level. Cassette openings should be mounted higher than potential snow build-up of your local area. Remove all damper blade-shipping hold down straps before assembling the sections together.

Suspension-mounted units have hanging arrangements that fall into one of two types and, in either case their mounts require proper design by a qualified Engineer. Smaller or lightweight units may be suspended from building supports with structural hanger rods. Larger units will require rigid level structural platforms. The hanging system must be designed with sufficient strength to support the unit and the forces created by the rotation of the fan(s) and motor(s). This base should allow only a minimum of distortion or deflection to the unit's base frame.

Position all sections as close to their final locations as possible before removing any shipping protection. Do not remove any shipping protection until it is absolutely necessary, and then remove only what is necessary to complete your task.

With most installations it will be apparent that one section of a unit must be installed first, either because of restricted access to its location or because it's final position is more critical than that of the following sections. Determine which section is most critical, and begin with your final positioning from that point.

Bolt sections together using provided hardware.

After all units are in position and bolt up is complete, shipping restraints should be removed from damper blade and air compressor if so equipped.

## **Ductwork Connections**

All transitions to the HRRF should be properly sized to minimize any associated noise along with static pressure losses. All duct connections should be well insulated to prevent any condensation or energy loss that could occur.

Where possible the aluminum cassettes should be placed in such a way that the intake and outlet are directly connected with the open air. If this is not possible then keep the ducts as short as possible. Care should be taken to prevent any moisture infiltration or condensation in the ductwork.

## **Condensate Line Connection**

In high moisture applications units are provided with drains to help remove collecting moisture from the system. When provided, the drain connection is located on the underside of the unit at the end closest to the interconnecting duct for both cassette housings (total two drains minimum). Before installing the HRRF, verify that the drain connection is tight to prevent leaking. The actual drain line must be field supplied and fabricated. Drain lines may need freeze protection (by others).

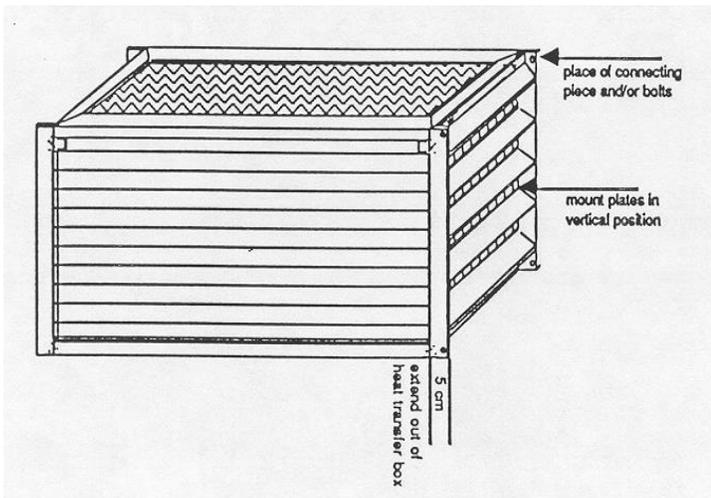
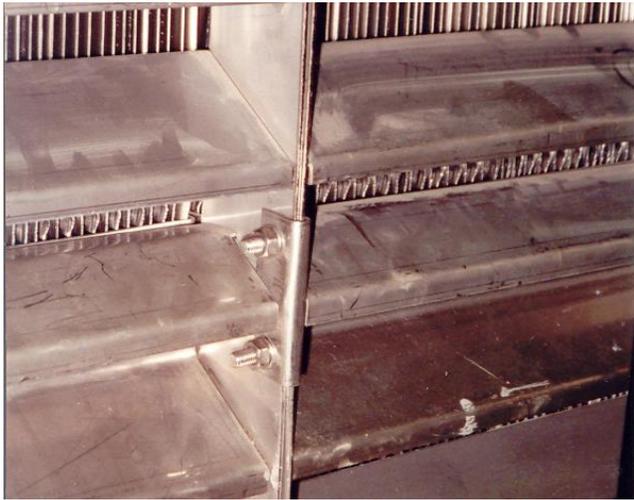
## **Insertion of Cassettes**

Make sure that the unit is securely supported prior to the insertion of cassettes.

The energy transfer box contains one or more aluminum plate cassettes. When assembling the unit the cassettes must be accessible for inspection and cleaning. Start with inserting and centering the cassettes from the bottom row, up. The plates should always be mounted vertically. The storm louvers or single louver are to be placed 2" inches outside of the energy transfer box for outdoor applications. Cassettes are bolted together using provided hardware. The retaining clip should be installed at the connecting junction of four cassettes to maintain the side-to-side, front to back alignment. To pull the cassettes out of the housing use the lowest louver. Do not use this louver to lift up the cassettes. The first row of cassettes should be centered in the opening, a fixed gasket is provided to fill any air gaps between the cassettes and the housing top and sides. Be careful not to tear this gasket while installing the cassettes.

Once all cassettes have been installed, loosen (removable) filler strips (outdoor units only) on sides and top of housing and slide against sides and tops of protruding cassette frames to achieve a finished and sealed look. Use caulking to fill any screw holes to prevent unwanted air leakage. Cassettes must be

sealed tightly within housing to achieve the highest efficiency possible. If required use additional solid panel installation to seal larger gaps on sides and top of cassettes from front to back.



## Filters

A filter (by others) can be placed both in the exhaust air and in the supply air streams. If filters are utilized they must be cleaned or replaced when needed. A dirty filter disturbs the air balance and will influence the efficiency and possibly cause other problems. The cassette modules are self-cleaning and generally do not need protection of filter under normal conditions.

## Kitchen Hoods

Kitchen exhaust should not be connected to the unit unless a grease filtering system has been incorporated. A proper filter will substantially protect the unit against deposits. Any deposits that do

reach the plates are easily removed, by power spaying the cassettes on a pre-determined schedule. Deposits will affect the efficiency of the system and possibly cause other issues.

Do not shut down the system in extremely cold weather conditions while system fans are still operating. Condensation may accrue on one side of the damper blade, potentially freezing it in its position. When restarting the damper any built-up ice accumulation may cause damage to it.

If unit is to be shut down during cold periods an enclosure heater, with it's own power supply, must be installed.

## **General Operation**

The system can be applied in either outdoor or indoor applications. All HRRF models provide 100% outside air without need of pre-heat or defrost control. Stationary cassette modules claim and store the heat energy from the exhaust air stream and, on the next cycle, transfer it back to the incoming or supply air stream. The air stream is diverted every seventy seconds (or pre-programmed intervals dependent on application) via a damper to interchange the exhaust and supply air streams.

The system, when sized correctly, can maintain a sensible recovery effectiveness of 90% on heating, 80% on cooling, +- 5% and up to 70% latent recovery in the colder months. The system will provide this recovery at temperatures to -40 F degrees below zero without core damage due to freeze-up, without need of bypass or pre-heat.

Proper SCFM air balance of exhaust / supply air must be maintained to achieve the above performance levels. Major air unbalances will severely affect the systems performance and may cause a potential freeze-up scenario.

## **Operation Check**

To start system, the following guidelines apply:

Make sure all the ducts and parts are mounted as per the installation instructions.

For cold start applications, start the exhaust fan at least five minutes prior to the supply fan.

Switch the unit on.

Make sure the air is flowing in the specified directions as per the installation drawing, flowing into and out of the ends of the cassettes.

Verify damper dwell time according to inputs from control timer. Normal dwell time is 70 seconds.

Validate clean, dry building air or optional compressor has been connected to each solenoid valve and the compressed air source of 90 psi, 3 cfm is delivered to the cylinder. Do not exceed 110 psi or valve damage may occur. Quality water/sediment filters for the compressed air source are required.

Check damper for proper operation. Ensure the damper is transitioning quietly and smoothly in approximately 1.5 to 3 seconds. If not, see Damper Transition Time Adjustment under Cleaning and Maintenance.

Check for any air leakage or blockage that may affect efficiency, static pressure drop, or general operation.

Consult damper control diagram for control and adjustment points.

If optional damper box compressor is provided make sure compressor shuts off. This is not a continuous run unit. The optional compressor cooling fan must be operational during warm outdoor conditions or when installed indoors to prevent compressor overheating and premature failure. The compressor does have overheat protection and will shut down. Failure of fan will drastically reduce the life expectancy of compressor and void the warranty. Refer to the specific compressor manual.

All outdoor units when provided with adjustable thermostat should be pre-set to 15°C (60°F). Confirm thermostat and heater operation. Keep all flammable items away from heater.

Check to make sure all lock nuts on switching valve speed controllers and pneumatic cylinder shaft rod clevis are tight.

On two/three damper systems make sure the dampers are configured “phased” correctly. The outboard dampers should allow air to flow through one side only during each 70-second cycle in order to achieve the correct directional airflow. To correct phasing simply switch the air hoses at the switching valve on one of the outboard dampers.

## **Cleaning & Maintenance**

### **Damper Section**

The damper section has been engineered to reduce the amount of maintenance or service required. Damper controls are factory pre-set and tested before shipping. The following is a list of the components within the damper section and if they need maintenance consideration:

No maintenance required for damper shafts of less than 1” diameter, which is supported on greaseless bearings.

Pneumatic cylinder and valve are permanently lubricated and do not need servicing.

Oil-less compressor, with perma-lube requires minimal maintenance. See compressor owner’s manual for preventive maintenance schedule. The compressor filter should be cleaned with soap and water every 3 months. Refer to the manual shipped with the unit for maintenance of the optional compressor if present.

Optional cooling fan within enclosure, when provided with compressor, must be operating during warm outdoor conditions to prevent compressor overheating and premature failure.

A quality water/dirt filter should always be used on all supplied air sources.

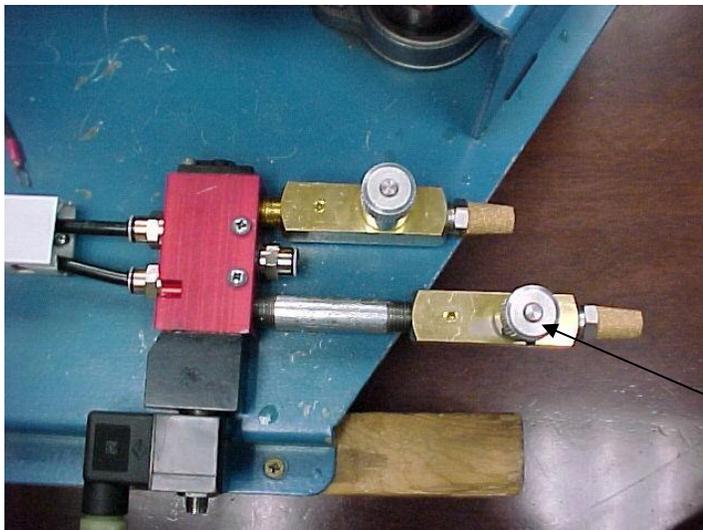
If HRRF is to be shut down during cold periods an enclosure heater, with it's own power supply, must be installed, if option is not already included.

## Damper Transition Time Adjustment

Damper transition time is pre-adjusted and set at the factory, before shipment, for a one to three second transition period. Timing will be predicated upon damper size. Shipping and final air velocities can cause changes to this setting which may need to be rectified on site. If, after start-up, a long transition time is noticed the following can be done to adjust:

Inside the damper control section locate pneumatic solenoid valve. There will be two gold-colored pneumatic mufflers attached to the valve.

These mufflers control the transition speed of the damper in each direction. To have a faster stroke time, use an Allen wrench to loosen lock-nuts and turn the appropriate adjusting knob clockwise to lengthen or counter-clockwise to quicken the transition speed. Be sure to re-tighten the lock nuts or damage may happen in future.



Allen head lock-nut on side of speed adjusting knob

If damper is transitioned to quickly a slamming situation may occur. Re-adjust immediately to avoid damage.

If problems are being experienced with any of the components in the damper section, the following is a list of possible malfunctions with solutions:

- Damper does not transition.
- Check if the damper is properly fastened and is not blocked by any other components or shipping straps.
- Check to see if the operation indicator is lit. If not check to make sure there is power to the unit.
- Check compressed air supply for the required pressure and evidence of water contamination.
- Check solenoid-valve operation.
- Check Pneumatic cylinder for air leaks.
- Check for leaking air hose connections.
- Damper moves too fast or too slow.
- Adjust the pressure “flow” restrictor valves on the pneumatic solenoid valve.
- Check for leaks in the air transfer lines and the connections to the solenoid valve. Replace the valve(s) or line(s) if defective.
- Damper cycle time too fast or too slow.
- Check timing program and re-program if necessary.
- Replace control timer.

## **Energy Transfer Cassettes**

Airflow directions are reversing every cycle and therefore allow a level of cassette self-cleaning. Cleaning once every five years is recommended to maintain the best energy recovery possible and optimize system performance.

The unit has two or more aluminum cassettes, depending on air volume, containing corrugated aluminum plates, which can be removed. The aluminum plates are held together by a stainless steel frame. By removing this entire cassette with steel frame, cleaning can be performed with a high power/pressure spray wash applied to the entire unit. The steel frame can be removed, via screws, to perform individual cleaning of each plate but cleaning the entire cassette is highly recommended without dismantling the frame.