AGC HEAT TRANSFER

*"Building the Best, Servicing the Rest"™*

# PROFLOW SERIES

## PLATE HEAT EXCHANGER OPERATION AND MAINTENANCE MANUAL

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**Eastern Factory**
10129 Piper Lane
Bristow, VA 20136
Phone 703-257-1660
Fax 703-330-7940
800-825-8820

**Central Office**
8400 Lakeview Parkway
Suite 700
Pleasant Prairie, WI 53158
Phone 847-301-6890
888-489-8820

**Western Factory**
3109 NE 230th Avenue
Fairview, OR 97024
Phone 503-774-7342
Fax 503-774-2550
800-715-8820

www.agcheattransfer.com

# Congratulations on your purchase of a new AGC ProFlow series plate heat exchanger.

This manual provides general information about your new heat exchanger as well as detailed information about the complete AGC product line. We recommend you read this manual carefully prior to installing or operating your new unit. If you have questions about your new heat exchanger please contact your local AGC distributor or the AGC factory. Contact information is located in the appendix section of this manual.

## Introduction:

AGC Heat Transfer designs plate and frame heat exchangers that cover the entire spectrum of fluid thermal processing. At the heart of each heat exchanger is the ProFlow plate. ProFlow series heat exchanger plates have been engineered to provide the very best combination of heat transfer and fluid flow. For most applications, ProFlow plates are fabricated from bright annealed type 316 stainless steel. In highly corrosive, or otherwise difficult applications, the ProFlow plates are also available in specialty alloys such as titanium, Hastelloy™, or other high nickel high chromium superalloys.

In addition to our plate line, we manufacture many different types and sizes of heat exchanger frames. These frames (also called presses) can be divided into two basic styles, the Tie Bolt frame and the Spindle frame. **Figure 1** shows a typical example of each type of frame.

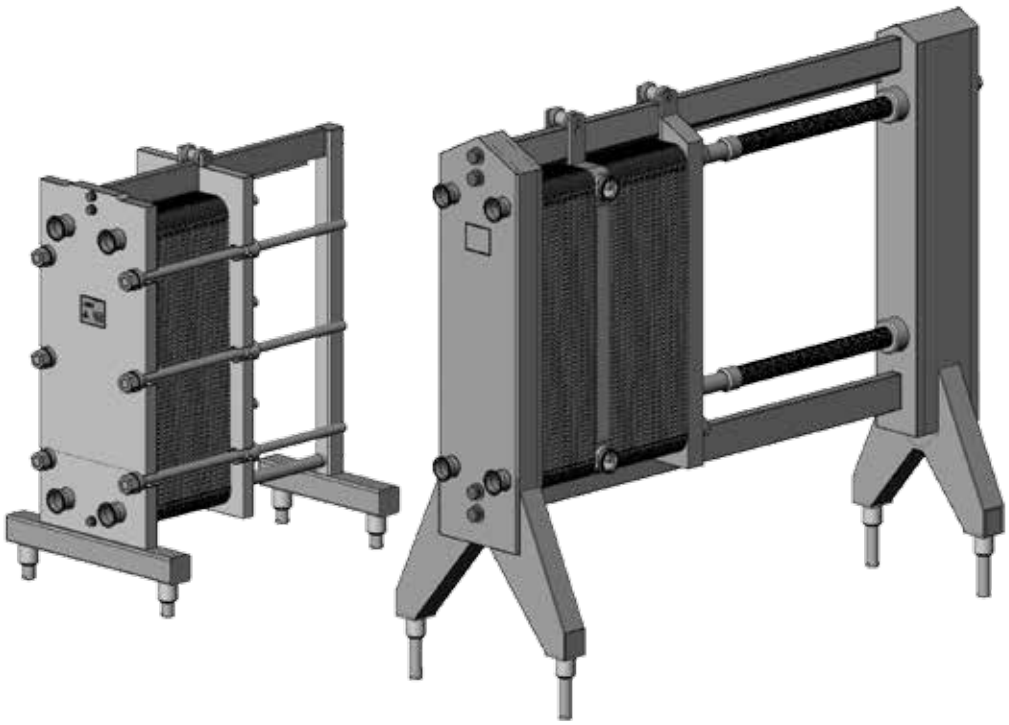


**Figure 1**
Typical Tie Bolt and Spindle Frames

The primary difference between the two frames is the closure mechanism. A typical tie bolt frame uses 6 heavy duty bolts to provide the closing force necessary for a pressure tight seal. The spindle style frame uses two large spindle screws to develop the closing force. Each type of press has features that give it advantages over the other. For example, a spindle frame is usually quicker to open or close than a tie bolt frame, but a tie bolt frame can have a smaller space requirement for the same number of plates. Other differences will be discussed later in this manual, but regardless of the closure type both frame designs use the same ProFlow heat exchanger plates and gaskets.

## Plate Heat Exchanger Basics:

At the most basic level, a plate heat exchanger is a stack of flat plates separated by a gap that will allow a fluid to be passed on either side of each plate. This simple design can be improved by adding a gasket around the perimeter of each plate and access holes (also called ports) at each corner. Corrugating the plates makes them more rigid and promotes turbulence in the fluid as it passes over them. This ensures even heat distribution and enhanced thermal performance. Properly designed corrugations also create metal to metal support points giving the plate its pressure holding capability. **Figure 2** shows a typical plate with a gasket and 4 open ports. Note the gasket (represented as a thick dark line) in the figure allows the fluid to flow between the two right side ports (top and bottom) while blocking the two ports on the left.

**Figure 2**
Vertical Flow Heat Exchanger Plate

The plate as shown in Figure 2 is what is referred to as a right hand vertical flow plate (the open ports are on the right side of the plate). All plates are viewed from the gasketed side. Heat exchangers use alternating right hand and left hand plates to create flow paths for the fluids. Vertical flow plates are quite versatile and can be used as either a right hand or a left hand plate. To use a vertical flow plate as a right hand plate, the plate will have the open ports on the right hand side (as shown in figure 2). To use this same plate as a left hand plate, simply flip it end for end so the open ports are on the left side of the plate. **Figure 3** shows a right hand plate flipped to become a left hand plate. Note: The asterisks shown in port 1 of the right hand plate rotates with the plate ending up in port 3 of the rotated plate.

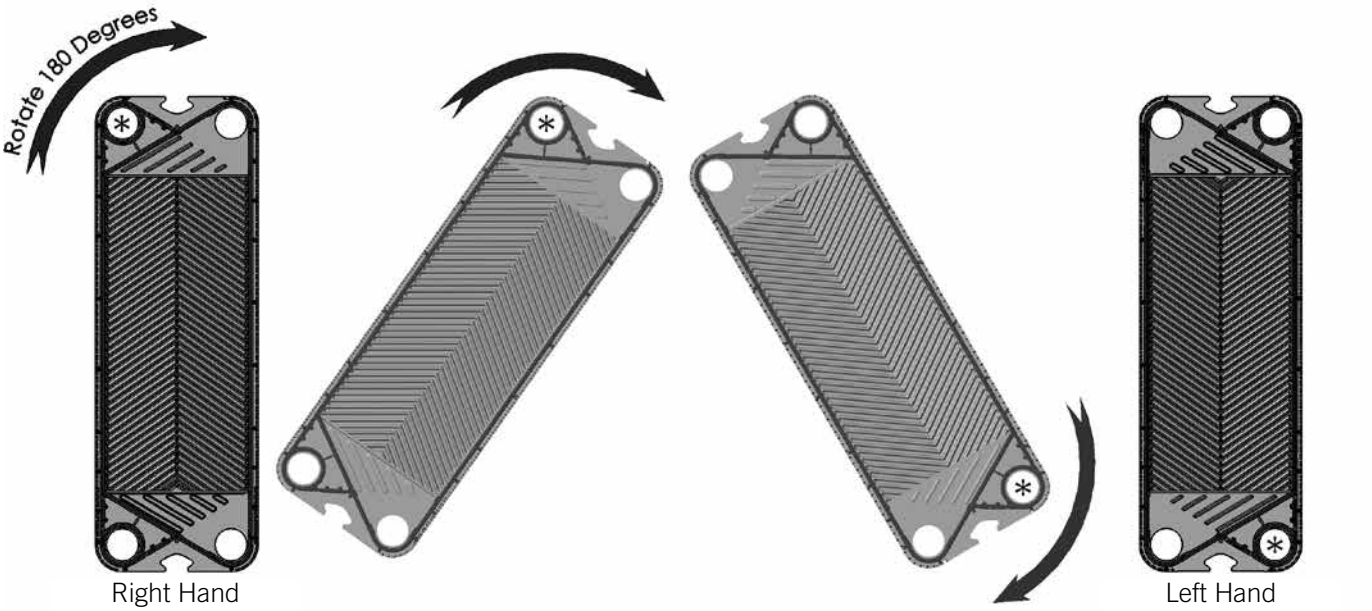



**Figure 3**
Vertical Flow Plate Orientation

The vertical flow plate design is used in the Pro2, Pro3, Pro013, Model 041, Model 080, and Model 300 frames. The Pro5 and ProHX frames use what is known as a diagonal flow plate design. The fluid flow path is diagonal across the plates. The diagonal flow plate has dedicated right and left hand designs. **Figure 4** shows both left hand and right hand examples of a diagonal flow plate. Again, all plates are viewed from the gasketed side.

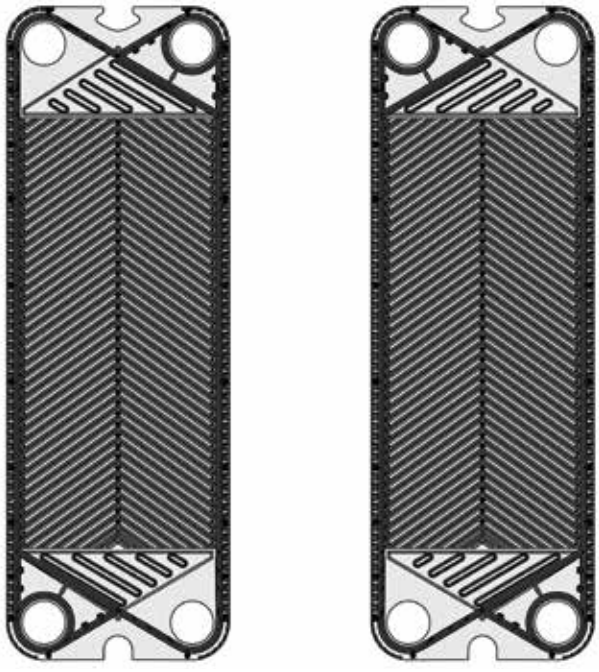



**Figure 4**
Diagonal Flow Plates

In a heat exchanger, right hand and left hand plates are stacked alternately to create fluid flow paths for different fluids. **Figure 5** shows a small plate arrangement that has 4 plates (2 right hand and 2 left hand). This arrangement will allow a hot fluid and a cold fluid to be passed through flow channels without actually mixing the two fluids. Note: In the figure the plates are separated to show the fluid flow path, but in practice these plates would be tightly pressed together forming narrow channels for the fluid to pass through.

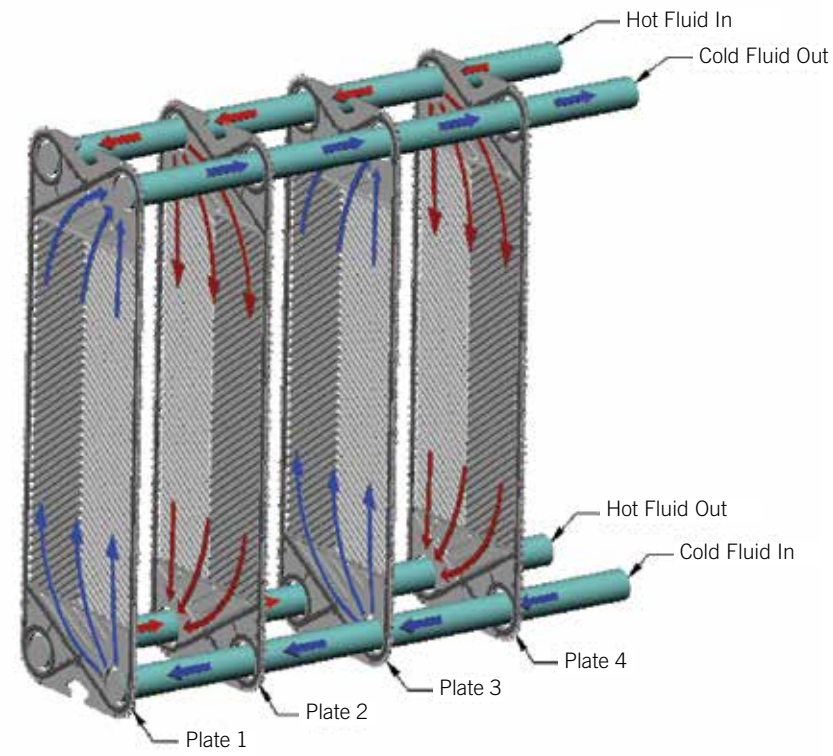



**Figure 5**
Simple Plate Pack

The cold fluid enters at the lower right ports of plates 1 and 3. It travels up the face of these plates and exits out of the upper right ports. The hot fluid enters at the upper left ports of plates 2 and 4 and travels down the face of these plates and exits through the lower left ports. This creates the condition where each plate has a hot fluid on one face and a cold fluid on the other. This is how the exchange of heat actually occurs. As long as the fluids are next to each other (separated only by the thickness of the heat exchanger plate), the hot fluid will cool and the cold fluid will warm. If the fluids are allowed to remain in this situation long enough both would eventually reach the same temperature or thermal equilibrium.

## Heat Exchanger Frames:

Given a basic understanding of the theory of operation of a plate heat exchanger we will turn the focus to the frames. Each different frame model has its own operation and installation manual which has a complete parts break down and maintenance procedures. This section will help you to identify the major frame components for each different style frame.

## Tie Bolt Frame:

The tie bolt style frame is typically used in applications where the heat exchanger is opened infrequently, or in applications where space or conditions make a spindle style frame impractical. Tie bolt frames can be ordered in stainless steel for sanitary applications, or with a durable powder coated finish. **Figure 6** shows a typical ProFlow tie bolt frame.

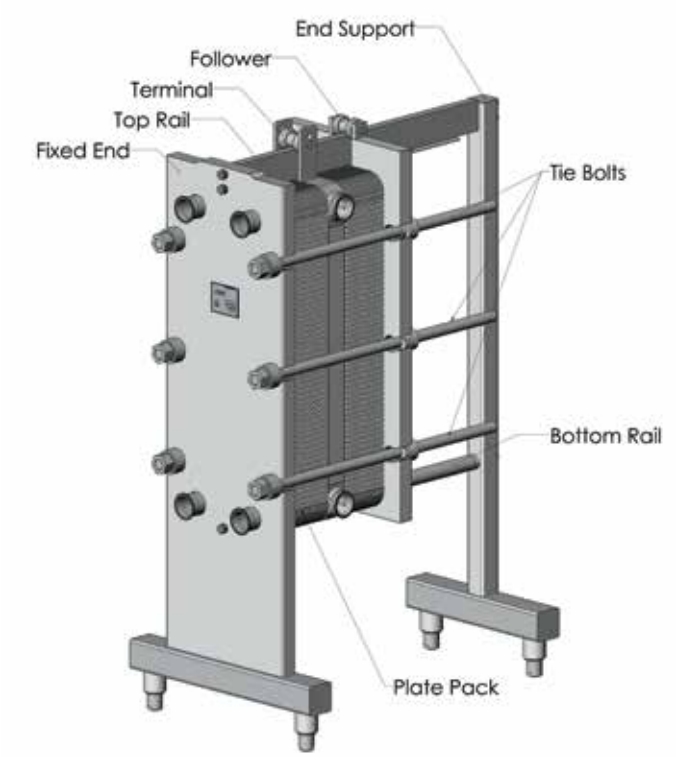



**Figure 6**
Typical Tie Bolt Frame Assembly

The frame consists of a fixed end, a follower, an end support, a top and bottom rail set, and 6 tie bolts. The frame can also be equipped with one or more terminals which allow the heat exchanger to be easily divided into different sections. Each different section can operate independently or in conjunction with other sections to create a complex system. AGC provides easily configurable ports at all locations on the fixed end and follower (8 total). Unused ports are either capped, or fitted with a port support. If after the frame is installed and put into service there are changes in production requirements, the capacity of a tie bolt style frame can be easily modified to accommodate those changes. This is done by simply changing the rail set and the tie bolts to adjust the frame size up or down.

## Spindle Frame:

The twin spindle frame is recommended in applications where the press is opened frequently or has a large plate pack. Since the twin spindle frame has just two screws to provide the closing force, the amount of time to open or close the press is much less than a comparably sized tie bolt frame. **Figure 7** shows a typical twin spindle frame.

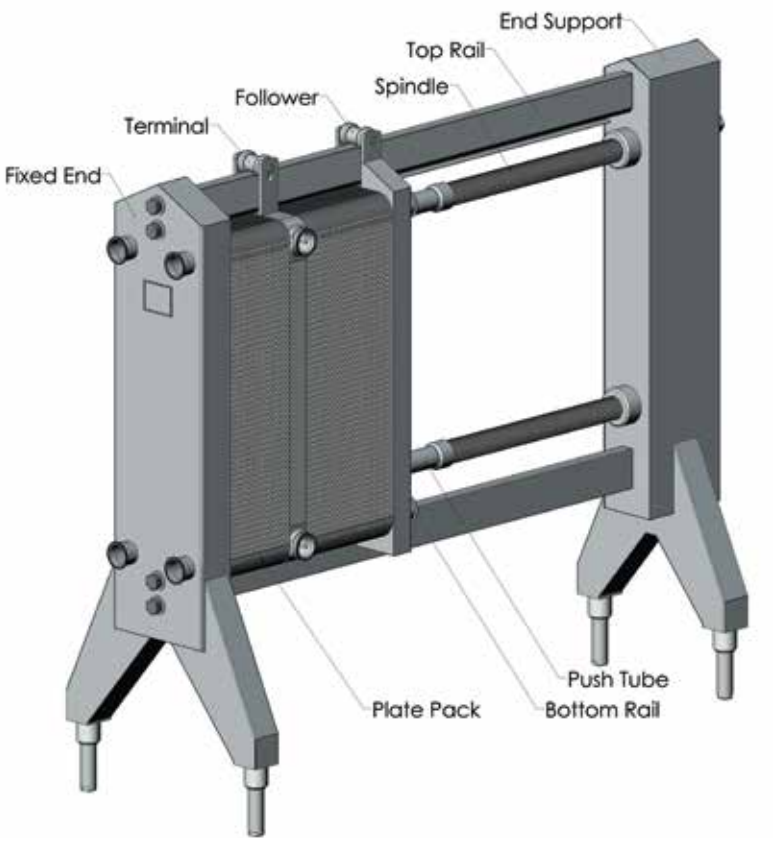



**Figure 7**
Typical Spindle Frame Assembly

The twin spindle frame, like the tie bolt style frame, has a fixed end, a follower, a rail set and an end support. Unique to the spindle frame are the spindle screws and the push tubes. Like the tie bolt frames, the spindle frames are modular in design, allowing a frame to be expanded on site. Twin spindle frames are only offered as a stainless steel clad frame. Many twin spindle frames are sold with the optional hydraulic end support closure mechanism. This option takes most of the manual labor out of opening and closing the press. It ensures the plates are compressed uniformly and closed to a consistent dimension every time.

## Heat Exchanger Fluid Flow:

The fluid flow path within a plate type heat exchanger is determined by how the plates are arranged and how each plate is configured or punched. The most common type of plate is the 4 hole flow plate. This is a plate that has punched or open port holes at all 4 corners and is commonly referred to simply as a flow plate. The example shown in figure 5 used 4 flow plates to create a small single pass with two streams in each pass. This section could be expanded to have many more streams by adding more pairs (left and right) of flow plates, but regardless of the number of streams it would still be considered a single pass design. Often, it can be advantageous to have multiple passes to enhance the performance of the heat exchanger. Multi pass designs are made possible by selectively blocking port holes on plates within the section. These blocked ports cause the fluid to change direction, so plates with blocked ports are referred to as change of direction plates or more commonly just change plates. **Figure 8** shows the plate

punching diagram for vertical flow plates. (The appendix of this manual has full sized plate punching diagrams for all ProFlow plate types.)

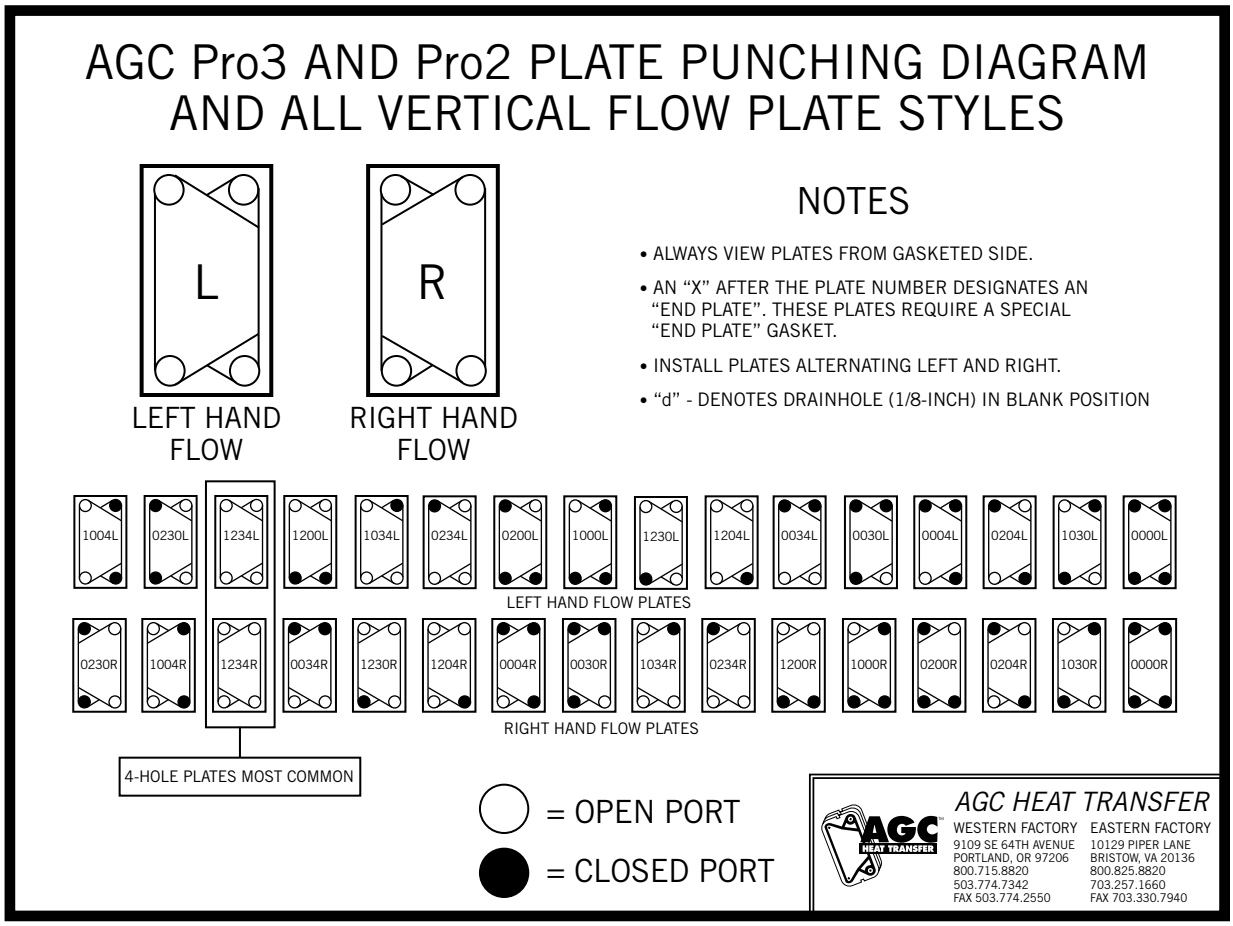



**Figure 8**
Vertical Flow Plate Punching Diagram

There are 16 possible combinations for punching a vertical flow plate. Each different combination has been assigned a code for identification purposes. Recall that the vertical flow plates can be used as either a left or right hand plate by simply turning the plate end for end. This means that depending on how the plate is viewed, the code will be different. All plates are viewed from the gasketed side and numbered from top left clockwise 1 through 4. Referring to the first plate listed on figure 8, a plate coded 1004L could also be coded 0230R by simply rotating it. This takes a left hand plate with open ports on the left side and blocked ports on the right side and changes it to a right hand plate with open ports on the right side and closed ports on the left side.

A schematic diagram system has been developed to show how fluid flows through the heat exchanger and how to arrange the plates. **Figure 9** shows a simple heater section that is a multi-pass design. This section will heat milk from a starting temperature of 40º F to a final temperature of 103º F using 120º F water. The section has 17 plates. Each plate is represented as a vertical line and has the punching code listed at the top. The dark boxes shown on the vertical lines represent the blank port locations. The lighter horizontal and vertical lines represent the fluid flow path.

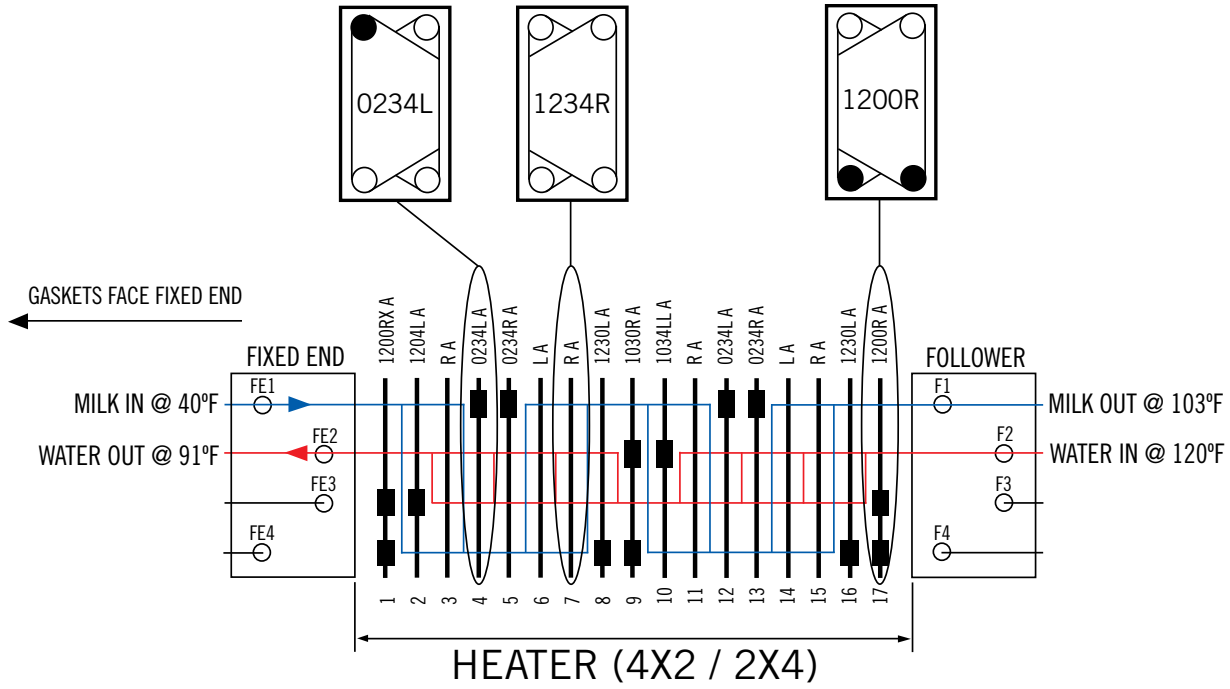



**Figure 9**
Heater Section

This heater is a 4X2/2X4 configuration. This means it has 4 passes of 2 streams on the milk and 2 passes of 4 streams on the water. The fluids will flow through the section in opposite directions. This is known as counter current flow. The milk enters the fixed end at port 1 (FE1) and exits through the follower at port 1 (F1). **Figure 10** highlights (in light green) the milk fluid flow path.

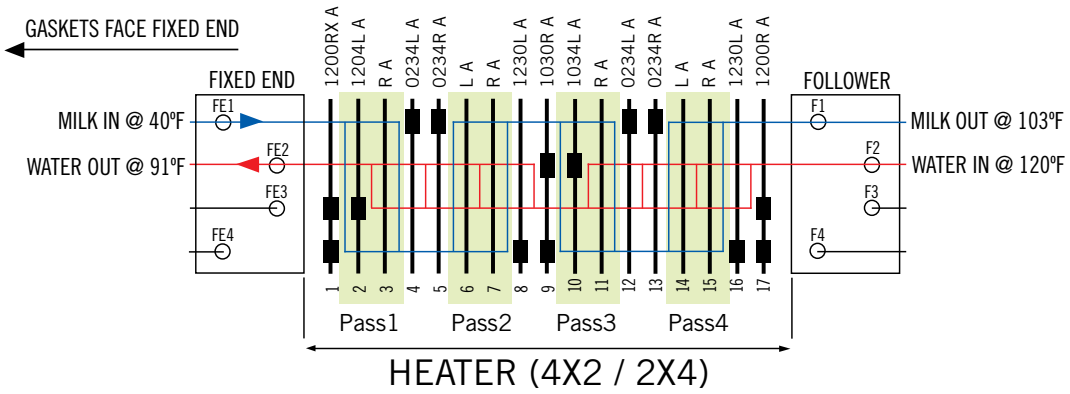



**Figure 10**
4X2 Milk Flow Path

In this figure the passes are outlined with a light green highlighted box to make them more apparent. The water fluid path is shown as bold red lines. The milk enters at FE1 then travels right until it reaches the blank port on plate 4. It flows down the channels created between plates 1&2 and plates 3&4 (these are the streams). The milk continues right until it reaches the closed port on plate 8. It will then flow up the channels between plates 5&6 and 7&8 continue right to the blank port on plate 12. It will flow down between plates 9&10 and 11&12 traveling right to the blank on plate 16. The milk will flow up between plates 13&14 and 15&16 finally exiting through port 1 on the follower (F1).

The water in this example has 2 passes with 4 streams in each pass. **Figure 11** shows the path the water will take through the heat exchanger.

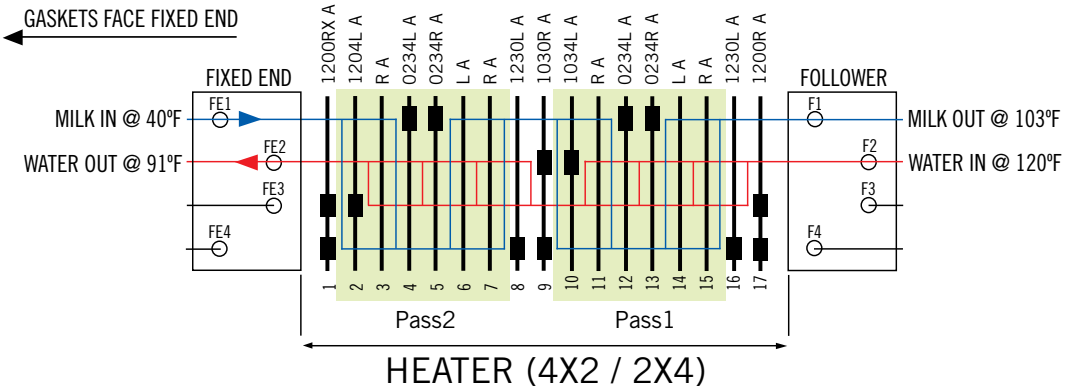



**Figure 11**
2X4 Water Flow Path

Water enters the heat exchanger at port 2 on the follower (F2). It travels left until it encounters the closed port on plate 10. It will then travel down the channels created between plates 16&17, 14&15, 12&13, and 10&11. The water will continue left to the blank on plate 2 where it will travel up the channels between plates 8&9, 6&7, 4&5, and 2&3 completing the second pass. The water will exit at port 2 on the fixed end (FE2).

This method of documenting the fluid flow and plate location is used on every AGC streaming diagram. While many diagrams are much more complex than this small example, the interpretation is the same no matter how elaborate or simple the streaming is.

# Reading the Streaming Diagram:

Each ProFlow heat exchanger or plate pack is shipped with a streaming diagram. Depending on the size and complexity of the heat exchanger, the streaming diagram could require several pages. **Figure 12** shows page one from a typical streaming diagram.

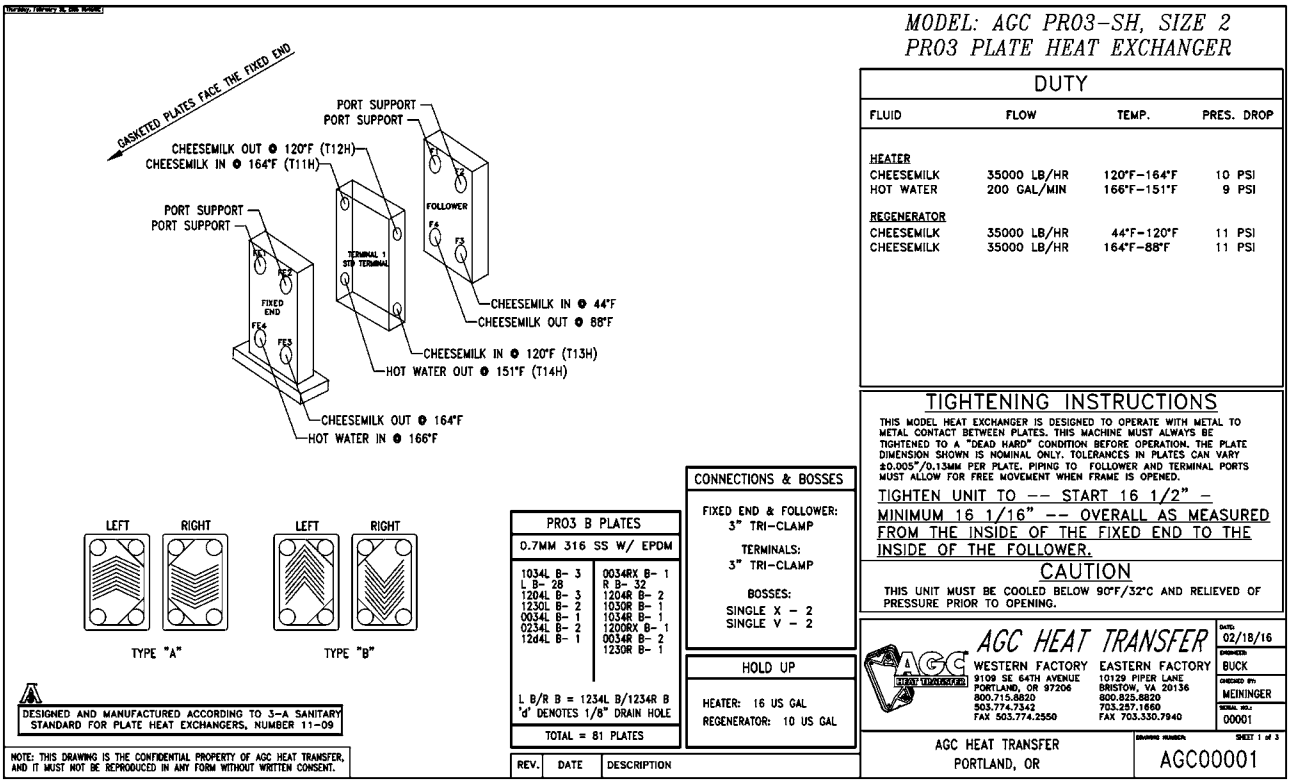



**Figure 12**
Page 1 of a Typical Streaming Diagram

This page of the streaming diagram contains a great deal of information about your heat exchanger. In the upper left quadrant, a block diagram shows the frame connections and expected temperatures. In every streaming diagram the connections are as viewed from the fixed end and are counted clockwise starting with the upper left (port #1). Moving to the upper right quadrant of the drawing the frame type and size is shown. Just below this you will find the duty block. The duty block lists the fluid flow, fluid temperature, and pressure drop for each fluid. Some units are designed to work with multiple fluids and may have more than one duty shown.

In the lower right quadrant the tightening dimensions are shown. Each frame has a start dimension and a minimum (or do not exceed) dimension. The two dimensions are calculated using the total number of plates plus the number and type of terminals. The start dimension assumes brand new plates and gaskets, all at the maximum material condition from the manufacturing process. The minimum dimension is calculated assuming all components are at the bottom end of the allowable tolerance. In practice, the actual fully closed (or dead hard) dimension will be somewhere between the start and minimum. Please contact AGC if you have questions about operating at or below the minimum compressed dimension.

In the bottom right hand corner the frame serial number and design date are listed. You should have this serial number available any time you call the AGC factory for service or spare parts for your heat exchanger. This will allow us to view a copy of the original streaming diagram, and in many cases we will be able to also look at any manufacturing notes from when the press was first built. This will ensure you get the appropriate parts and service for your heat exchanger.

Next to the serial number block (in the lower center of the page) you will find the connection types for each connection. Below the connection types the fluid hold up is listed. This is the amount of fluid each section will contain when full. To the left of this box is the plate type and plate count chart. This shows the plate type, gasket material, and the total number and plate configuration for all plates used in the heat exchanger. If any revisions have been made to the heat exchanger a revision table will be in a separate block under the plate list.

Page two of the streaming diagram shows how the plates are arranged. Depending on the size of the heat exchanger, the plate arrangement may require more than one page. **Figure 13** shows the second page of our example diagram.

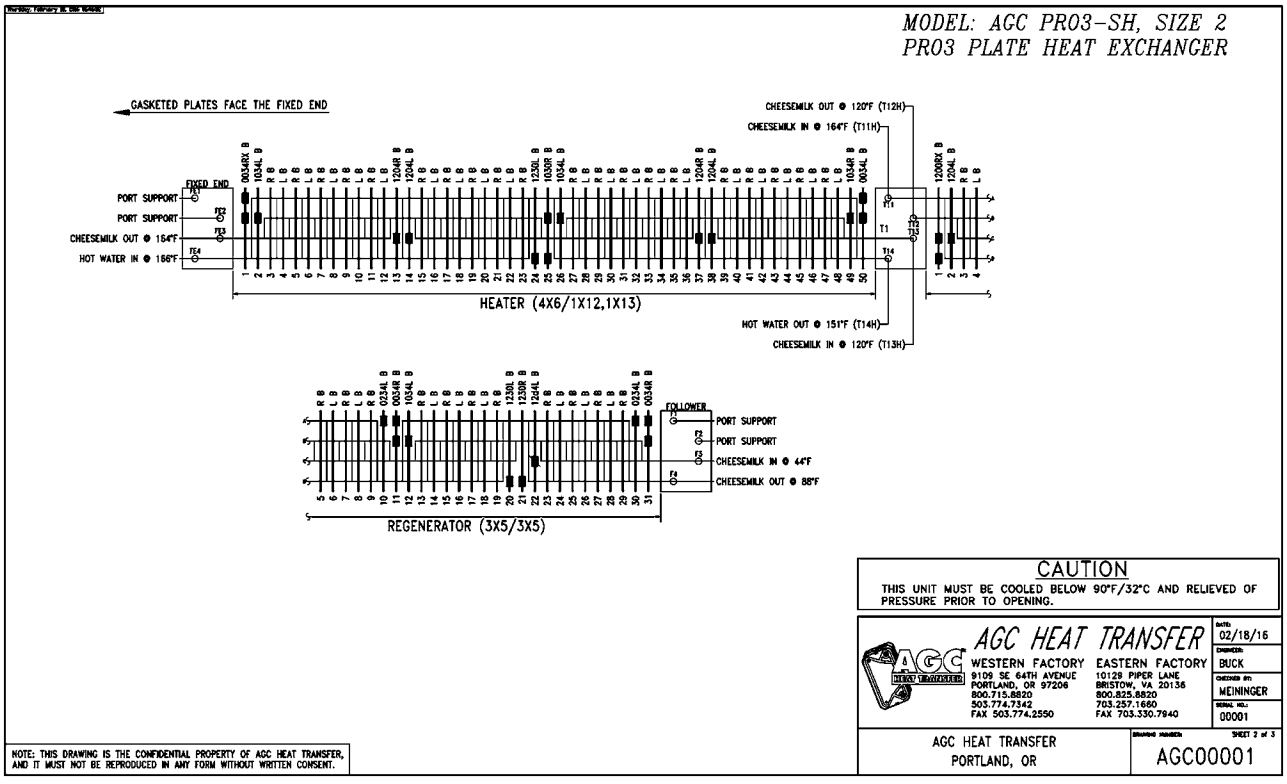



**Figure 13**
Page 2 from a Typical Streaming Diagram

This example is more complex than the simple section shown in figure 9, but the method to interpret the information is identical. It is very important to have this section of the streaming diagram available any time the heat exchanger is opened. Changing the order of the plates could drastically alter the performance of the heat exchanger.

**Figure 14** shows the final page of the streaming diagram. This page provides the basic dimensions of the press. It will also list any special components that have been installed on the frame. If the frame has removable ports, the ports and part numbers will be listed on this page. Also, if the press is equipped with seismic foot pads, the installation recommendation will be shown on this page.

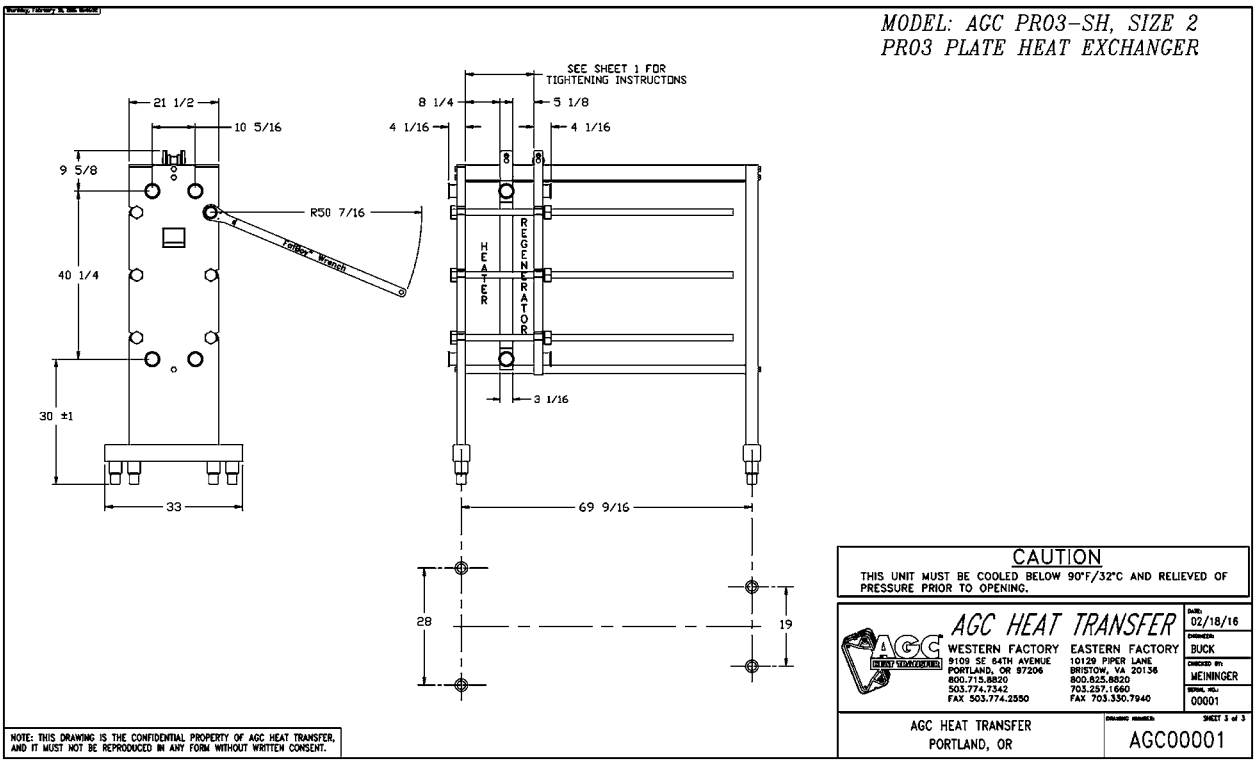



**Figure 14**
Streaming Diagram Final Page

## ProFlow Plates and Gaskets:

A plate heat exchanger can be a very energy efficient device if it is configured properly. The ability to create multiple flow paths within a single unit gives the plate type heat exchanger a definite advantage over other types of heat exchangers. The ProFlow series plates and gaskets provide additional flexibility to the design engineer. In addition to being available in vertical flow and diagonal flow designs, most ProFlow plates can be ordered in two different chevron angles. This allows the design engineer to tailor the fluid flow characteristics to match the system requirements. **Figure 15** shows the two different thermal flow styles, Type A and Type B. These can be used alone or together to fine tune the thermal characteristics and fluid flow.

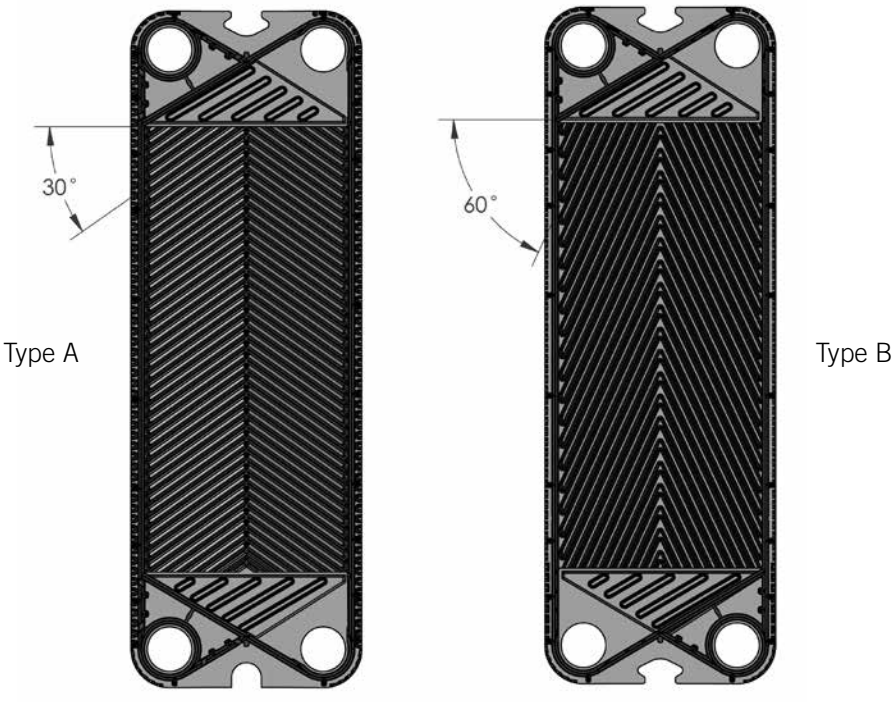



**Figure 15**
Chevron Styles Available

The different chevron angles change the fluid dynamics through the heat exchanger. For example, some applications require more fluid flow resistance to effectively distribute the product over the surface of the plate. In this case your sales engineer will design the process to have more pressure drop. Other situations may have products that can't tolerate high shear rates and as such require a design that would compensate for this requirement. Your particular application will determine which chevron style or combination of styles will work best.

Another selectable feature for the heat exchanger is the gasket. Our gaskets are manufactured in several different compounds to match the requirements of most applications. Most ProFlow plates use a snap in style gasket, often the factory glues the gaskets to the plates as a courtesy service. By precisely gluing the gasket in place, and then oven curing the adhesive we ensure the gaskets will remain securely fixed to the plates through repeated cycles of opening and closing the heat exchanger. Because most of the ProFlow gaskets are a snap in type, in the event a gasket needs to be replaced on site, the process is usually trouble free. Simply peel off the worn gasket, clean any residual glue from the gasket groove then snap the replacement gasket in place and reinstall the plate. Adhesive may be used sparingly (forming a continuous glue bead) in the gasket groove if the heat exchanger is opened and closed often. Keep in mind, too much glue will adversely affect the sealing ability of the gasket. Contact the AGC factory for recommendations on adhesive type and for instructions on proper gasket installation.

When ordering gaskets it is important to know which gaskets you need. Typically, a heat exchanger will have a combination of flow gaskets, end gaskets and port gaskets. If the heat exchanger uses diagonal flow plates the gaskets will be dedicated right or left hand. Refer to your streaming diagram to determine what type and how many gaskets you need. The factory

can provide a recommended spare parts list to help you decide which plates and gaskets to keep on hand for emergencies or for regular system maintenance.

## Plate Installation and Removal:

When working with plate heat exchangers, as well as any other industrial machinery, it is important to ensure that all local safety regulations are followed. At a minimum, gloves and safety glasses should be worn whenever handling the heat exchanger plates.

The ProFlow plate is designed so it can be easily installed onto or removed from the hanger strip. **Figure 16** shows the installation method.

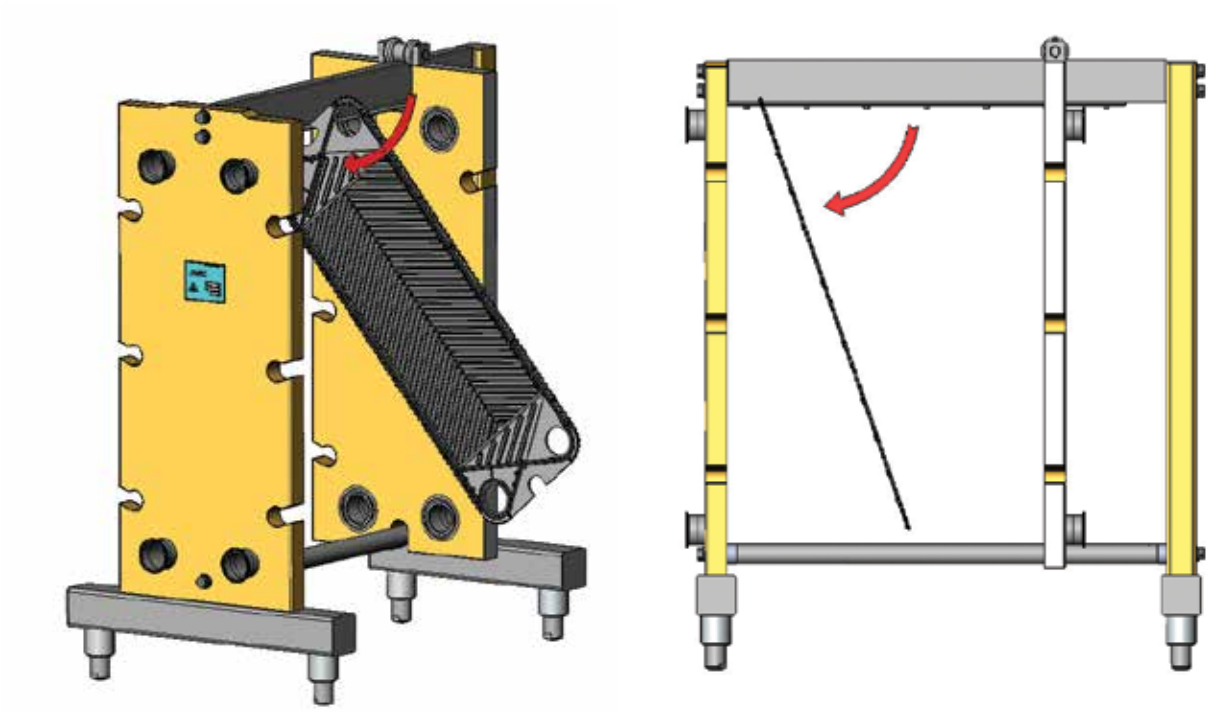


**Figure 16**
Installing a Plate

Applying a small amount of food grade grease on the hanger strip will make sliding the plates easier and will extend the life of the heat exchanger plates. Installing a ProFlow plate can be broken down into three steps. First, angle one side of the plate hanger onto the top rail. Second, keeping the bottom edge of the plate slightly tilted away from the fixed end, swing the plate over the bottom rail hooking the other side of the hanger onto the hanger strip. Third, swing the plate parallel to the fixed end and slide the plate up to the fixed end. Repeat the process with all remaining plates making sure to alternate plates left then right. As the plates start to stack up you will notice a honeycomb pattern is formed with the plate sideband. If the pattern is interrupted that means a plate is out of order and must be corrected. **Figure 17** shows examples of incorrect and correct side band alignment.

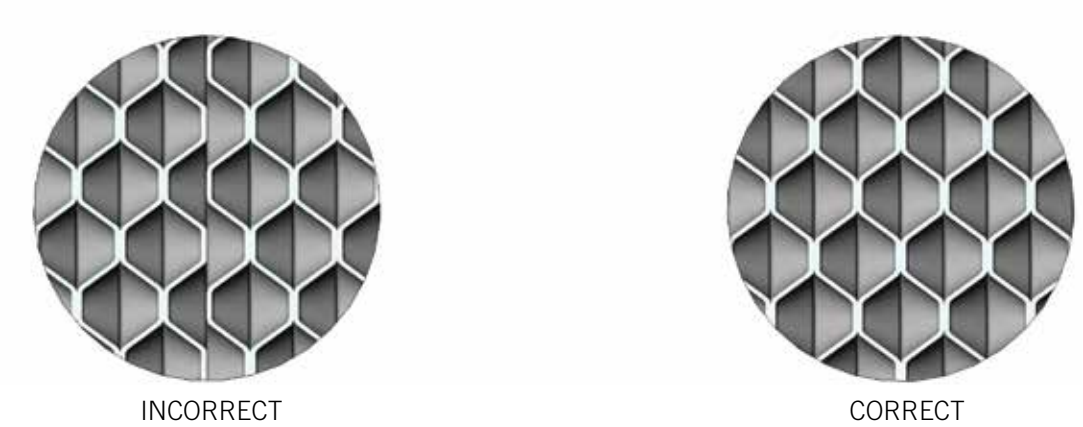



**Figure 17**
Plate Side Band Pattern

It should never be necessary to bend the plate to install or remove it. If you are having trouble installing the plates please contact AGC for assistance. With practice you will be able to install or remove the plates quickly, just remember the order in which the plates are installed must match the streaming diagram exactly.

After the plates are installed the press can be closed. Refer to your streaming diagram for the appropriate closed dimension. When closing the heat exchanger it is important to ensure the follower is kept as close to parallel with the fixed end as possible. Using small increments when closing the tie bolts (or spindles on a spindle frame) will ensure the plates seat well, reducing the possibility of a leak. Also, always use a high quality food grade anti-seize on the threaded members prior to opening or closing. The following procedure should be followed closely to ensure the press is closed safely.

- Tie bolt frames typically use 6 tie bolts. **Figure 18** shows the recommended sequence for tightening the tie bolts. With the plates hanging freely, install all 6 tie bolts into the slots on the fixed end and follower, bringing them up to the follower just hand tight. Using a wrench tighten tie bolt #1 about 1/2 inch. Move the wrench to tie bolt #2 and tighten it about a half inch as well. This will move the follower about 1/2 inch. The 4 remaining bolts can then be tightened by hand to bring them snug between the fixed end and follower. Depending on the size of the plate pack, this sequence can be repeated many times. As the plates begin to provide more resistance to closing, the increments the tie bolts are tightened should be reduced to approximately 1/4". At this point the wrench will be required for all 6 bolts. Remember, the goal is to keep the follower parallel to the fixed end and flat against the plates. If all 6 bolts are not used equally when closing the press, the plates or press could be permanently damaged. By closing the bolts in the sequence shown, and using all 6 bolts, the amount of work necessary to close the press is reduced.

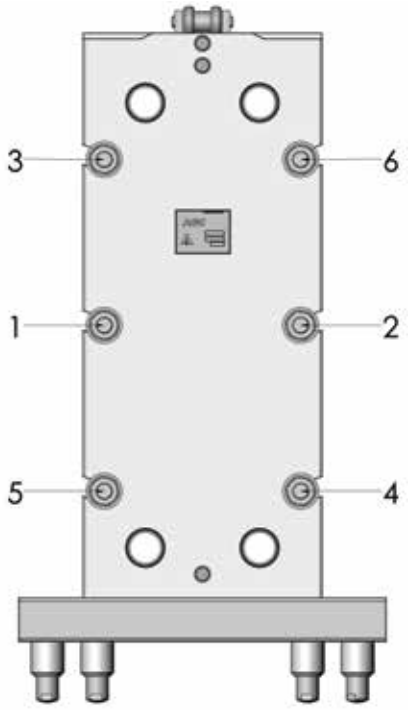



**Figure 18**
Tie Bolt Tightening Sequence

- Spindle frames use two spindle screws to close the heat exchanger. Spindle frames are offered in two versions, either with an automatic or a manual closure. The automatic closure closes both spindle screws simultaneously so all the operator needs to do is move the control valve to the close position. The manual version is closed using a wrench. When closing a manual twin spindle frame alternate between the upper and lower spindles ensuring they are always within 1/2" of each other. As the plate pack approaches the start dimension the measured difference between top and bottom spindles should be no more than 1/4". The final dimension between the fixed end and follower should be equal top to bottom and side to side.

Opening the heat exchanger is similar to closing it. Keep in mind, the press must be relieved of any internal pressure and cooled below 90º F (32º C) prior to gradually opening the tie bolts or spindles. It is just as important to the opening process as it is to the closing procedure that the follower be moved evenly and kept close to parallel to the fixed end. With a tie bolt style frame, DO NOT FULLY REMOVE any tie bolt prior to the press being fully opened. You may be tempted to remove some tie bolts letting just one or two remaining bolts hold the follower in place. This could create a very dangerous situation. The press is designed to have 6 tie bolts share the forces developed from the closing process. By removing one or more bolts the remaining bolts must pick up the extra load. Also, if the bolts are removed from just one side the follower could twist allowing the bolts on the other side to slip out of their slots causing the follower to rapidly move toward the end support. As with the closing process, use anti-seize lubrication on the threaded bolts, and follow the sequence, starting with small increments (1/4" per bolt) and gradually increase up to 1 inch per bolt as the load diminishes.

Once the press is fully opened and all tie bolts are removed, slide the follower back to the end support. Removing a plate from the press is simply a reverse of the installation procedure. First tilt the bottom of the plate toward the follower enough to clear the bottom rail. Next swing the plate out pivoting it on the top rail hanger. The far side hanger should disengage from the plate allowing the plate to be lifted from the frame. **Figure 19** shows how to remove a plate from a tie bolt style frame (the same procedure works for spindle frames as well).

If all of the plates are going to be removed from the press, marking each plate with a sequence number will make reassembly easier later.

**Figure 19**
Plate Removal

## Plate and Gasket Inspection:

Regular maintenance and inspection of your heat exchanger will ensure it is functioning properly and reliably. AGC offers a comprehensive field inspection service for your heat exchanger. A complete description of our PlateCheck™ service is shown in the appendix section of this manual. We have factory trained technicians that can fully check your heat exchanger on site. We recommend you have your press inspected at least once a year. In between full inspections simple operator maintenance can catch small problems before they lead to down time. Following these simple procedures will keep your heat exchanger operating at its optimum.

- **Plate Inspection:** With the heat exchanger opened, inspect the plates for obvious signs of damage or leaks. Shiny spots at the contact points are normal, but large indentations or evidence of corrosion are signs the plates need a professional inspection. If the unit has been subjected to hydraulic shock or has been over pressurized, the surface of the plates, particularly the gasket grooves, may be permanently deformed. It is often difficult for the untrained eye to detect un-wanted bends on the heat exchanger plates since the plates are highly corrugated by design. Plates that are deformed will not perform properly and should be

replaced. If your heat exchanger is having leakage problems, and you're not sure what is causing the problem, contact the AGC Factory for assistance. If the problem can't be corrected with telephone support a professional inspection may be required.

- **Gasket Inspection:** The gaskets should be flexible without any cracks or tears. If a gasket is hard, brittle, or has taken a compression set (permanently deformed) it should be replaced. Gaskets that have been in service for extended periods of time, or are subjected to aggressive chemicals, may have signs of material breakdown or erosion along their inner edge. To test a gasket for breakdown, simply rub it firmly with your thumb or finger. If the gasket leaves a black residue on your finger this is a sign the polymers are breaking down and the gasket should be scheduled for replacement. If the gasket has obvious signs of erosion (i.e. the width of the gasket is inconsistent) it should be replaced.
- **Frame Inspection:** Inspect the frame for signs of damage or leaks. If the frame is stainless steel clad, check the cladding for signs of cracks or leaks. If the cladding is bloated, this is a sign that fluid has penetrated the cladding and the frame requires repair. Cracks in the cladding or ports are normally caused by external connections that are not well supported or are misaligned.

## Exchange Plate Packs:

One of our most popular services is the exchange plate pack service. After your heat exchanger has been installed for an extended period of time, the plates and gaskets will start to exhibit normal signs of wear. With the plate pack exchange service, our factory can ship a replacement plate pack directly to your location. The exchange plate pack can be new or fully reconditioned (used) plates depending on the option you choose. The exchange plates will match the streaming of your heat exchanger and are stacked in reverse order in specially designed crates to make the installation process very easy. You simply remove your old plates and replace them with the exchange plates. Then return your old plates to the AGC factory. We will inspect your plates and if they pass inspection they will be reconditioned and you receive a credit for each good plate. Plates that don't pass inspection are scrapped. There is a small fee for the inspection of bad plates. Your sales engineer can provide a quote for this service.

**APPENDIX:**

# AGC Publications:

AGC Heat Transfer can provide copies of the operation and installation manual for all plate heat exchangers within the product line. Revisions are sometimes necessary and your particular model may have had engineering changes since your unit was first built. The manuals currently available from AGC Heat Transfer represent the latest revision level. Each heat exchanger should have a name plate affixed to the fixed end that shows the build date for the press. By having this build date available when ordering a manual, it will enable the factory to highlight any changes that would impact your heat exchanger.

**The following is a list of available operation and installation manuals:**

- AGC Model AR56 Operation and Installation (Covers all AR56 Models)
- AGC Model Pro2 Operation and Installation (Covers all Pro2 Tie Bolt Models)
- AGC Model Pro2-XP Operation and Installation
- AGC Model Pro3 Operation and Installation (Covers all Pro3 Tie Bolt Models)
- AGC Model Pro3-XP Operation and Installation
- AGC Model AR51-M Operation and Installation
- AGC Model AR51-H Operation and Installation
- AGC Model AR51-D Operation and Installation
- AGC Model Pro31-M Operation and Installation
- AGC Model Pro31-H Operation and Installation
- AGC Model Pro21-M Operation and Installation
- AGC Model Pro21-H Operation and Installation

# AGC Factory Contact

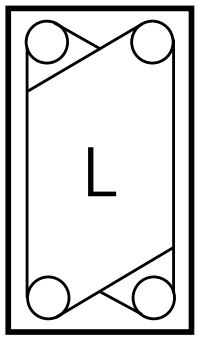

**Eastern Factory**
10129 Piper Lane
Bristow, VA 20136
Phone 703-257-1660
Fax 703-330-7940
800-825-8820

**Central Office**
8400 Lakeview Parkway
Suite 700
Pleasant Prairie, WI 53158
Phone 847-301-6890
888-789-8820

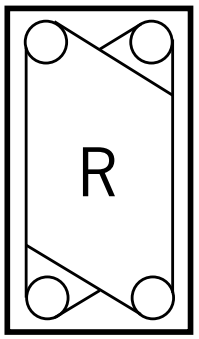
**Western Factory**
3109 NE 230th Avenue
Fairview, OR 97024
Phone 503-774-7342
Fax 503-774-2550
800-715-8820

**www.agcheattransfer.com**

# AGC Pro5™, Pro5PluS™ AND ProHX™ PLATE PUNCHING DIAGRAM AND ALL DIAGONAL FLOW PLATE STYLES



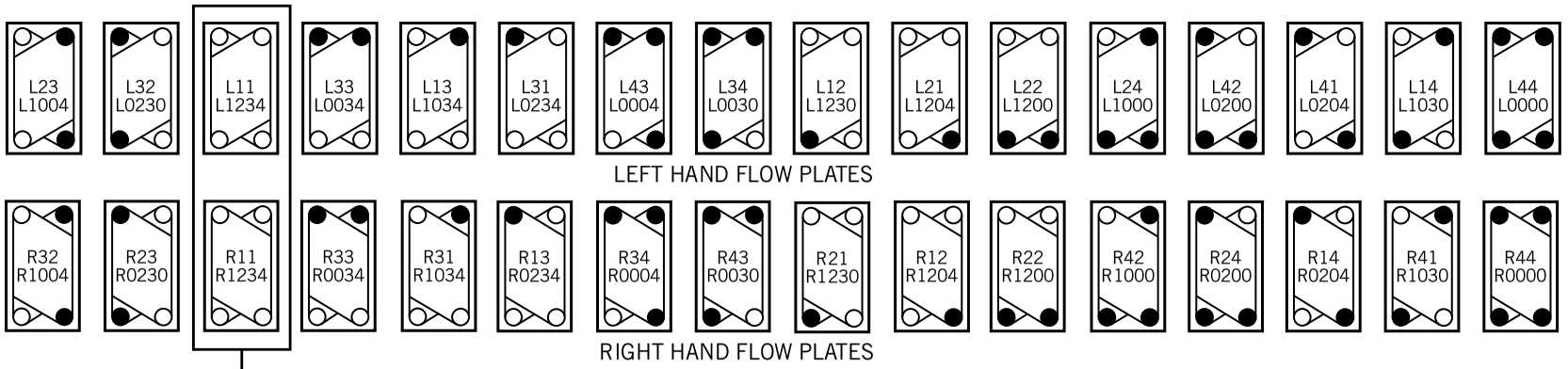

LEFT HAND FLOW




RIGHT HAND FLOW

## NOTES

- ALWAYS VIEW PLATES FROM GASKETED SIDE.
- A “K” BEFORE THE PLATE LETTER DESIGNATES AN “END PLATE”. THESE PLATES CANNOT BE USED AS FLOW PLATES. THEY REQUIRE A SPECIAL “END PLATE” GASKET. A RIGHT HAND END GASKET IS NOT THE SAME AS A LEFT HAND END GASKET
- INSTALL PLATES ALTERNATING LEFT AND RIGHT.
- “d” DENOTES DRAINHOLE (1/8-INCH) IN BLANK POSITION




= OPEN PORT

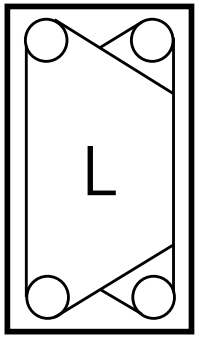
= CLOSED PORT


*AGC HEAT TRANSFER*

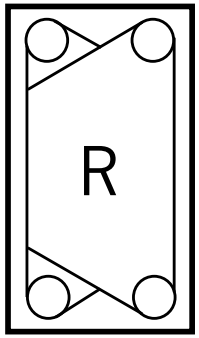
WESTERN FACTORY
9109 SE 64TH AVENUE
PORTLAND, OR 97206
800.715.8820
503.774.7342
FAX 503.774.2550

EASTERN FACTORY
10129 PIPER LANE
BRISTOW, VA 20136
800.825.8820
703.257.1660
FAX 703.330.7940

# AGC Pro3 AND Pro2 PLATE PUNCHING DIAGRAM AND ALL VERTICAL FLOW PLATE STYLES



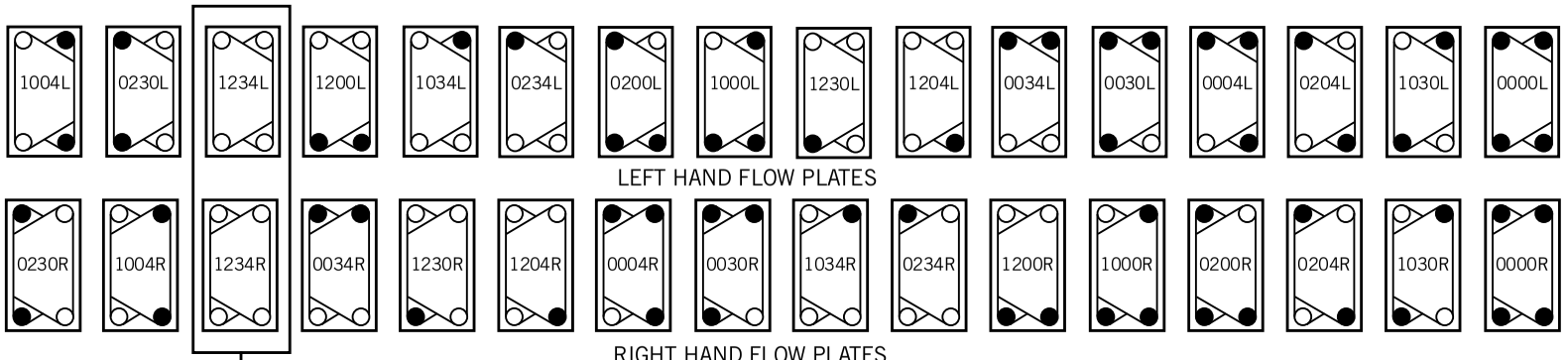

LEFT HAND FLOW




RIGHT HAND FLOW

## NOTES

- ALWAYS VIEW PLATES FROM GASKETED SIDE.
- AN "X" AFTER THE PLATE NUMBER DESIGNATES AN "END PLATE". THESE PLATES REQUIRE A SPECIAL "END PLATE" GASKET.
- INSTALL PLATES ALTERNATING LEFT AND RIGHT.
- "d" DENOTES DRAINHOLE (1/8-INCH) IN BLANK POSITION




○ = OPEN PORT

● = CLOSED PORT

AGC HEAT TRANSFER

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PORTLAND, OR 97206
800.715.8820
503.774.7342
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10129 PIPER LANE
BRISTOW, VA 20136
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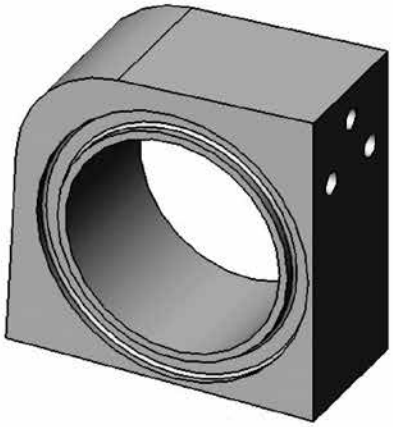
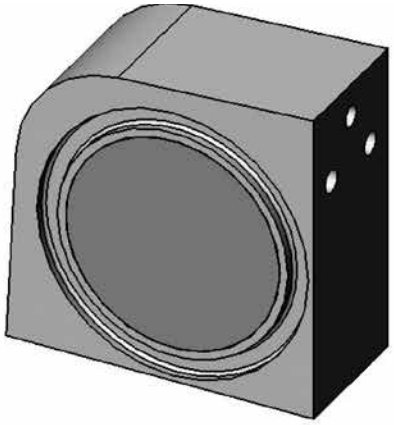
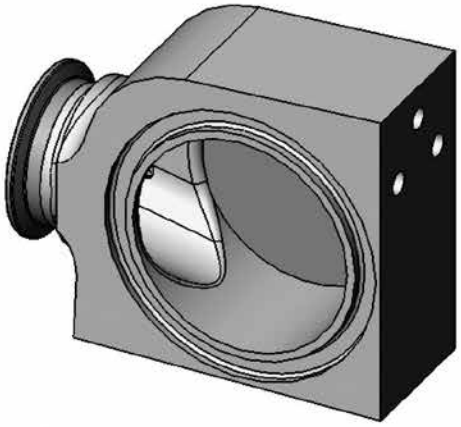
# AGC TERMINAL PORT BOSS IDENTIFICATION



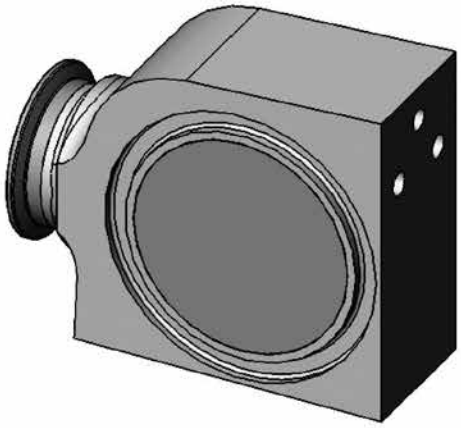
**THRU BOSS**



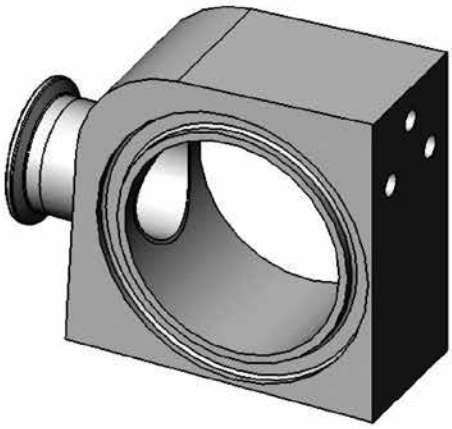
**BLANK BOSS**



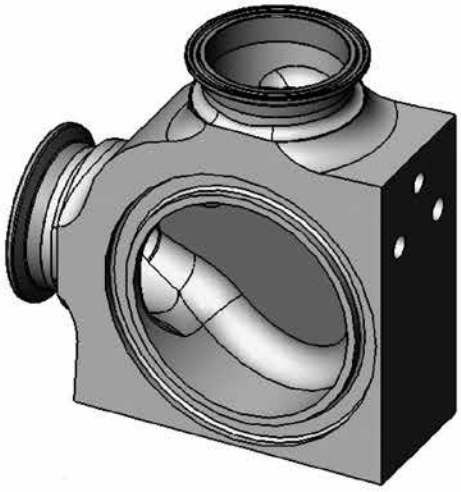
**SINGLE V BOSS**



**SINGLE X BOSS**



**THRU BOSS W/PRESSURE SWITCH**



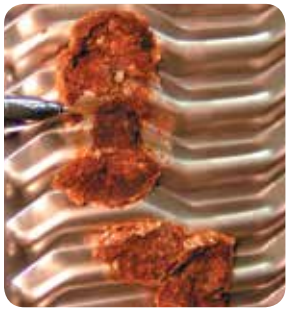
**DOUBLE BOSS**

PlateCheck
Seeing is Believing

# The clear choice in FAST field PHE inspections.

- Checks 100% of the plate surface for pin-holes and precisely identifies the location in one simple test.
- Checks for gasket, frame, plate wear/corrosion and CIP response.
- Unit to be opened as little as once. All sections tested at the same time.
- 3-4 hours typical total test time per HTST Pasteurizer.
- Hydrodynamic pressure test using exclusive food grade inhibited dye (AGC RI-606) and plain water.
- No chemicals, heat and no BOD added to the waste stream.
- Meets current 3A standard 11-09 for testing plate heat exchangers.
- Detailed confidential report.

## Our PlateCheck service will check for these problems and more.


CIP Response


Pin Holes


Plate Corrosion/Wear


Gasket Condition


Frame Condition

**FOR MORE INFORMATION** call 800-825-8820 Eastern / 888-489-8820 Central
800-715-8820 Western / online at www.agcheattransfer.com

## NOTES:

AGC HEAT TRANSFER


## EASTERN

10129 Piper Lane | Bristow, VA 20136

703.257.1660 | 800.825.8820 | FAX 703.330.7940

## CENTRAL

8400 Lakeview Parkway, Suite 700 | Pleasant Prairie, WI 53158

847.301.6890 | 888.489.8820

## WESTERN

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