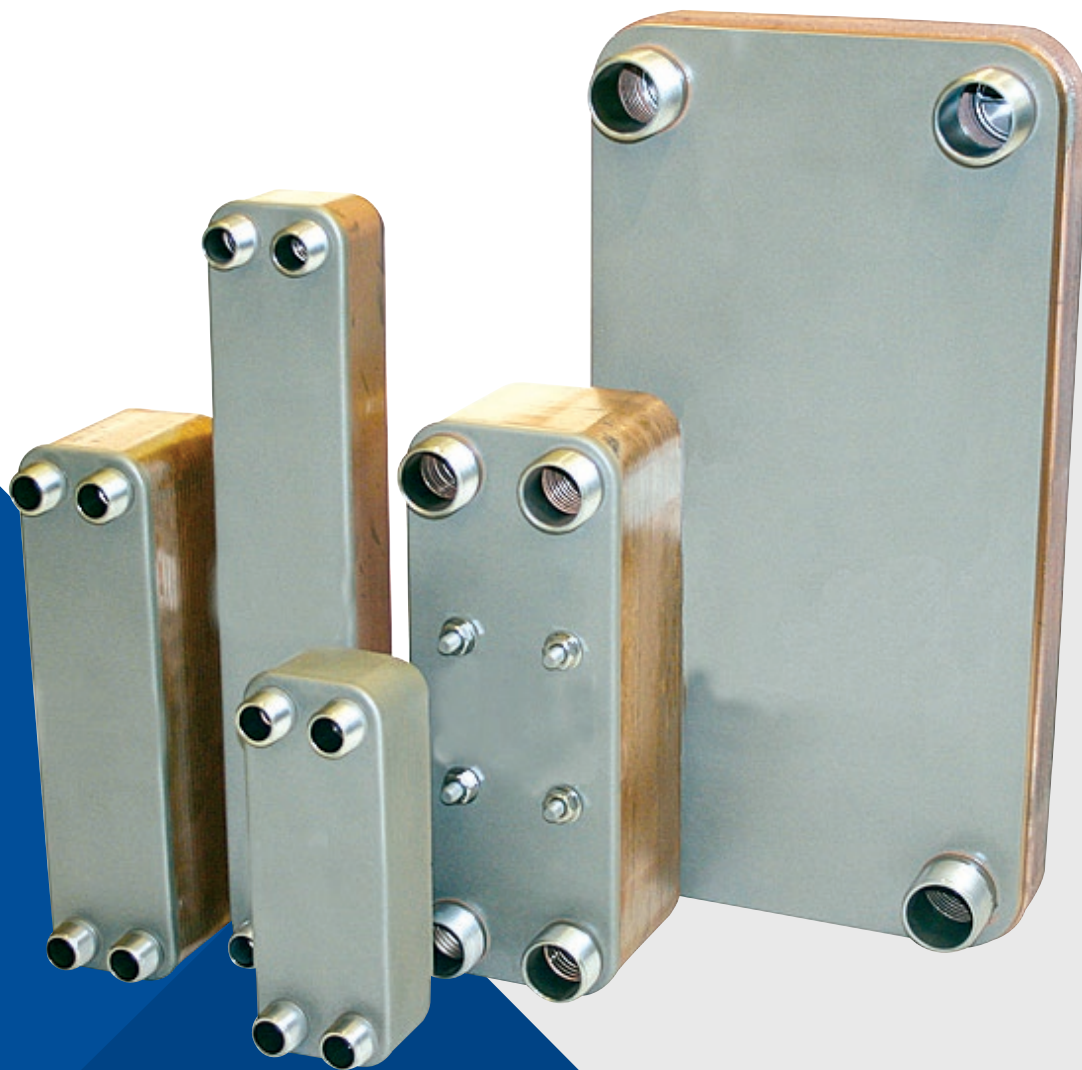


# BRAZED PLATE HEAT EXCHANGERS

## 1081 BP SERIES



# AURORA 1081 BP SERIES BRAZED PLATE HEAT EXCHANGERS

Higher Performance  
Increased Efficiency  
More Versatility

## MODEL AP – FOR DOMESTIC HOT WATER HEATING APPLICATIONS

Brazed Plate heat exchangers are ideal and offer a compact, high output capacity for Domestic Hot Water heating applications. These heat exchangers offer substantial advantages over shell & tube, tank & coil, U-tube bundles and other older technologies when used in both hot water boiler (AP series) and steam applications (APSMO series). These advantages include the unit being easier to install, rig and maintain at 1/5 the size and weight with a faster response and long life use.

Brazed Plate models are excellent for both new construction and replacement applications. Three types of piping installations are typical:

**Recirc to Tank Only:** A recirc pump to the hot water tank is typical in most residential and light commercial applications.

**Recirc Loop in Building:** A recirc loop is used, with or without a hot water storage tank, for many commercial and industrial applications.

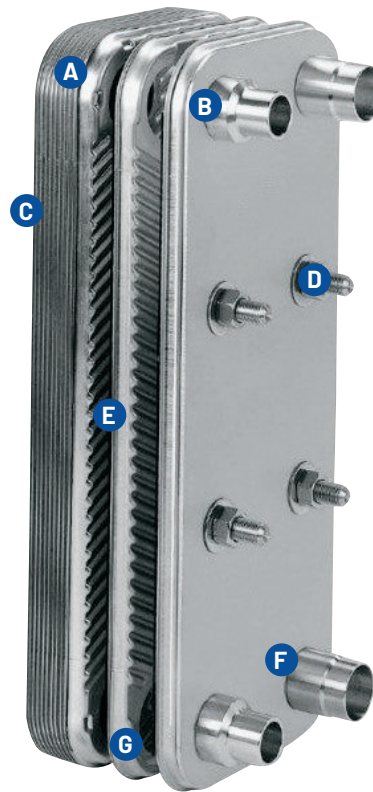
**Instantaneous:** Instantaneous hot water heating can be used in a few installations.

## PIPING

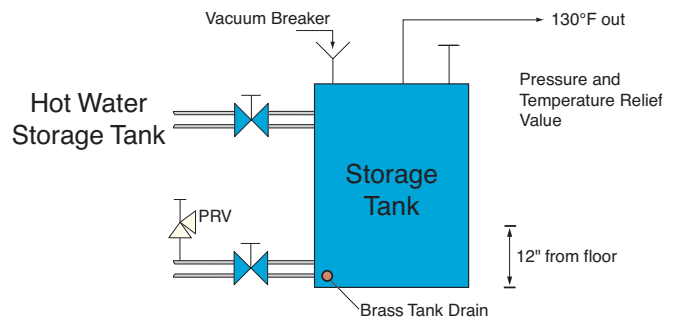
Tee(s) on the output side of the HX are recommended for convenience in case future chemical descaling and cleaning is required.

## CONTROLS

Typical control of the pumps (Recirc to Tank only) should use an aqua stat in the hot water storage tank to maintain set point temperature (i.e. 130°F).



- A. EASY TO INSULATE
- B. PROPERLY SIZED CONNECTIONS
- C. COMPACT
- D. STUD BOLTS FOR INSTALLATION AND MOUNTING
- E. HIGH PERFORMANCE HEAT TRANSFER SURFACE
- F. STRONG, RUGGED CONNECTIONS
- G. TOTALLY SEALED CONSTRUCTION



NOTE: Storage tanks over 120 gals. or 200,000 BTU must have ASME Certification.

# PUMP FEATURES

## CONTROLS FOR RECIRC LOOPS

For recirculated domestic hot water systems (i.e. apartments, hospitals, factories and office buildings), a motorized three-way mixing valve is REQUIRED on the boiler side and should be modulated based on water temperature leaving the heat exchanger into the domestic water loop. The hot water loop pump runs continuously; this maintains the hot water set point for the loop and storage tank. The recirc pump should flow 100% of the return loop water through the heat exchanger, then to the storage tank (if required; depends on boiler capacity) at all times to minimize scaling and maximize BTUH output. City water inlet is recommended before the heat exchanger and after the pump to maximize the heat exchanger capacity.

## CONTROLS FOR INSTANTANEOUS WATER HEATING

A three-way tempering valve is required and an anti-scalding safety device must be installed. The boiler pump should run continuously.

## CONTROLS FOR STEAM SYSTEMS

A modulating steam valve and proper steam trapping is required.

## START-UP

The bypass/balancing valve should be adjusted at full load to obtain the proper return water temperature to the boiler.

For applications with a recirc domestic hot water loop, the modulating three-way valve should be adjusted so that it maintains proper domestic water temperature and does not hunt or overshoot. Slow to medium response rate is recommended.

DIAGRAM 1 – RECIRC TO TANK

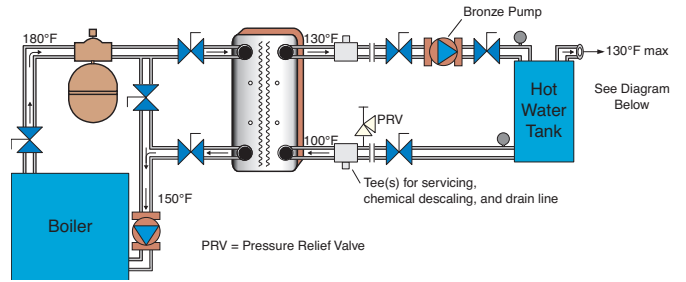


DIAGRAM 2 – RECIRC TO BUILDING LOOP

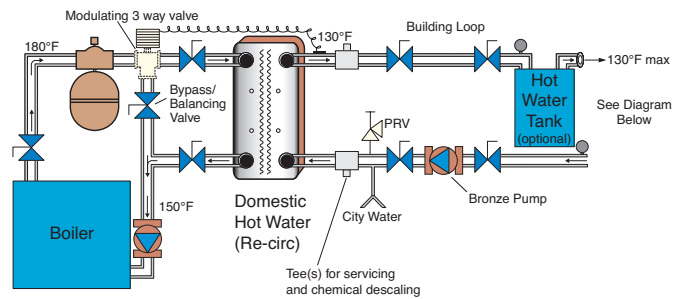
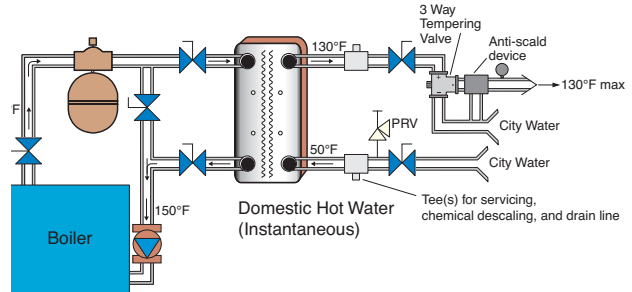


DIAGRAM 3 – INSTANTANEOUS



# POTABLE WATER AND CHEMICAL APPLICATIONS

## MODEL APDW – FOR DOMESTIC HOT WATER HEATING APPLICATIONS

The APDW model is a Double Wall, Vented Heat Exchanger designed to meet local and state plumbing codes for double separation of potable water from boiler water and other non-potable fluids. As a cost effective, full range heat exchanger, the APDW model is a true Double Wall Vented design with double wall plates and double seal fluid ports, both of which have positive leak detection. The APDW model also has full thickness 316L copper brazed plates for longer product usage and reliability. Compact and easy to install, the APDW model is ideal for new construction or shell & tube replacement. Optional ASME Code.

### PIPING

Tee(s) on the output side of the HX are recommended for convenience in case future chemical descaling and cleaning is required.

### CONTROLS

Typical control of the pumps (Recirc to Tank only) should use an aqua stat in the hot water storage tank to maintain set point temperature (i.e. 130°F).

### CONTROLS FOR RECIRC LOOPS

For recirculated domestic hot water systems (i.e. apartments, hospitals, factories and office buildings), a motorized three-way mixing valve is required on the boiler side and should

be modulated based on water temperature leaving the heat exchanger into the domestic water loop. The hot water loop pump runs continuously; this maintains the hot water set point for the loop and storage tank. The recirc pump should flow 100% of the return loop water through the heat exchanger, then to the storage tank (if required; depends on boiler capacity) at all times to minimize scaling and maximize BTUH output. City water inlet is recommended before the heat exchanger and after the pump to maximize the heat exchanger capacity.

### CONTROLS FOR INSTANTANEOUS WATER HEATING

A three-way tempering valve is required and an anti-scalding safety device must be installed. The boiler pump should run continuously.

### CONTROLS FOR STEAM SYSTEMS

A modulating steam valve and proper steam trapping is required.

### START-UP

The bypass/balancing valve should be adjusted at full load to obtain the proper return water temperature to the boiler.

For applications with a recirc domestic hot water loop, the modulating three-way valve should be adjusted so that it maintains proper domestic water temperature and does not hunt or overshoot. Slow to medium response rate is recommended.

# POTABLE WATER AND CHEMICAL APPLICATIONS

## MODEL APSMO – FOR SWIMMING POOLS AND SPAS

Piping: Pools and Spas always have high water flow rates, from 30-50 GPM for a typical residential pool to higher GPMs for commercial applications. Because the APSMO model is a high efficiency heat exchanger and does not require the full pool GPM flow, a bypass/balancing valve is required to bypass 50%-80% of the pool water. The bypass/balancing valve should be adjusted and permanently set at startup.

Chemical feeds MUST be downstream from the heat exchanger. A check valve should be installed to prevent backflow of chemicals into the heat exchanger when the pump is not in operation.

## CONTROLS

Temperature control of the pool should be based on a return water temperature stat, controlling (on/off) the boiler and boiler pump. Temperature control of the 90°F-100°F feed to the pool should be controlled by permanent adjustment of the bypass/balancing valve.

## START-UP

Start up the system and adjust the pool side bypass/balancing valve so that the pool initially heats up no faster than 2°F/hr. After the pool reaches approximately 78°F-80°F and the boiler water enters at 180°F, adjust the pool side bypass/balancing valve to obtain 90°F-100°F water to the pool. Then, adjust the boiler bypass/ balancing valve so that approximately 150°F water returns to the boiler.

NOTE: Install a zinc anode on the swimming pool/spa side piping when using an electronic chlorinator.

## MODEL APDW

DIAGRAM 1 – RECIRC TO TANK

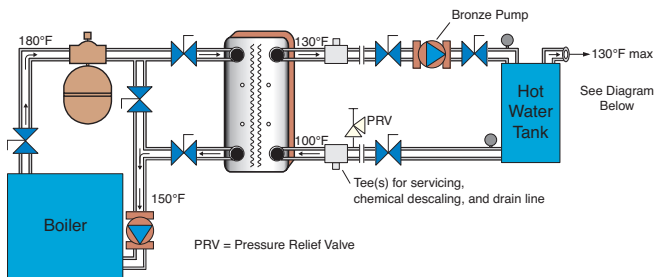


DIAGRAM 3 – INSTANTANEOUS

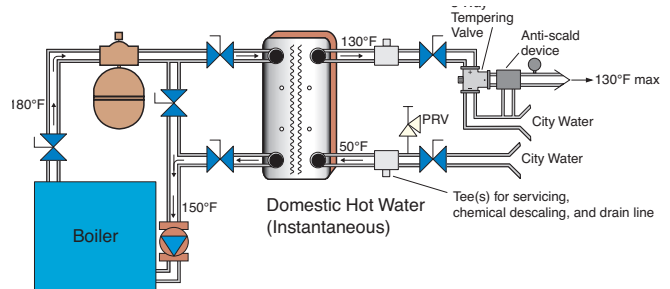
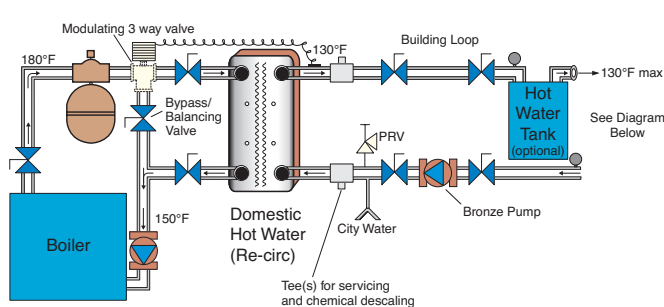
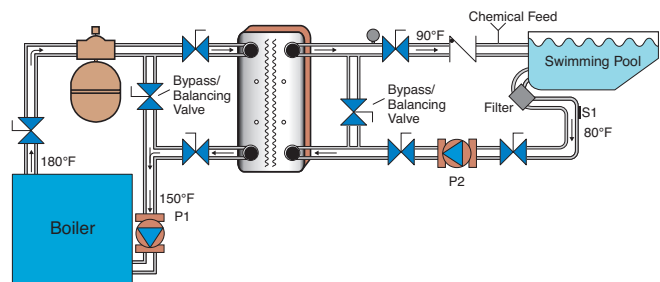


DIAGRAM 2 – RECIRC TO BUILDING LOOP



MODEL APSMO



# SNOW MELT AND RADIANT FLOOR APPLICATIONS

## MODEL AP – FOR SNOW MELT APPLICATIONS

Brazed Plate heat exchangers are very cost effective in Snow Melt applications, providing high output, fast response and separation of the fluids. Used for boiler water to glycol heat transfer and, in some applications, zone isolation, the AP series provides an easy solution to Snow Melt systems.

Most Snow Melt systems are boiler water to glycol 10%-40% (typical), depending on location and weather conditions. The heat exchanger isolates the glycol from the boiler water and provides an oxygen barrier to the boiler, which protects other components in the boiler system.

## PIPING

A boiler side bypass/balancing valve is recommended, but not required. A three-way tempering valve or motorized control valve on the snow melt side is required.

## MODEL AP – FOR RADIANT FLOOR APPLICATIONS

Many radiant floor applications utilize

Brazed Plate heat exchangers to reduce the overall cost of the radiant floor system installation. This is possible when using cast iron boilers and radiant tubing (with lower cost,

no oxygen barrier) and for applications where isolation of the boiler to radiant floor loops are needed. These actions simplify installation and minimize costs.

Brazed Plate models also make it possible to interface steam boilers to radiant floor systems, both low pressure and high pressure steam systems (up to 300 psi) using the APSMO series.

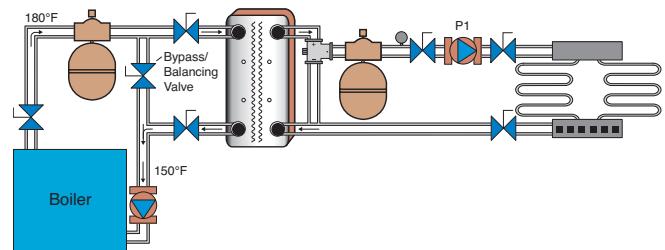
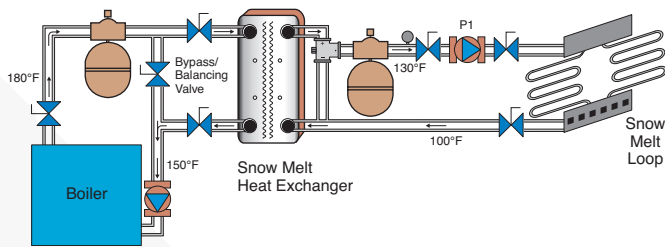
## CONTROLS

A three-way tempering valve is required to allow for adjustment of the snow melt side and to limit the temperature of the glycol. For radiant tubing in sand, maximum glycol temperature is 140°F. In asphalt and concrete, maximum temperature is typically 150°F. Recommended set point 130°F for the glycol snow melt side.

## START-UP

Adjust the three-way tempering valve to 130°F or the desired set point.

Another strong application is using a domestic hot water heater to provide heat to a radiant floor system bathroom radiant floor, or for add-on projects. This is easily accomplished using a Brazed Plate model to isolate the domestic water from the radiant floor loop.



# CLOSE APPROACH APPLICATIONS

## MODEL AP – FOR CLOSE APPROACH

Brazed Plate heat exchangers can be used in applications whereby the Approach Temperatures can be 10°F or less and as low as 2°F, which means the heating (or cooling) source will heat (or cool) the secondary load side to within a 2°F-10°F of the source temperature. This capability allows for a variety of applications and versatility for utilizing Brazed Plate heat exchangers. Brazed Plate heat exchangers can be used for many Fluid-to-Fluid applications where a heating (or cooling) source is used to transfer heat to a load.

## APPLICATIONS INCLUDE

A boiler side bypass/balancing valve is recommended, but not required. A three-way tempering valve or motorized control valve on the snow melt side is required.

- ◆ Boiler water to process
- ◆ Chilled water to process
- ◆ Glycol to process water
- ◆ Process water to process water
- ◆ Hot water heater to radiant floor
- ◆ Cooling tower/free cooling to chilled water loop
- ◆ Engine water to process
- ◆ High pressure (300 psi) isolation to low pressure (150 psi) equipment
- ◆ Sea water to process (APSMO Series)

Approach Temperature = Side A (Source) Entering Temperature (°F) minus Side B (Load) Leaving Temperature (°F)

### Example:

Side A: 95°F in , 85°F out

Side B: 77°F in , 87°F out = 8°F Approach

**Temperature Difference (TD) of (Side A or Side B) are defined as:**

Entering Temperature minus Leaving Temperature

### Example:

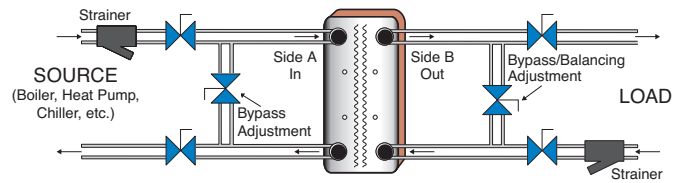
Side A: 95°F in , 85°F out = 10°F TD for Side A

Side B: 77°F in , 87°F out = 10°F TD for Side B

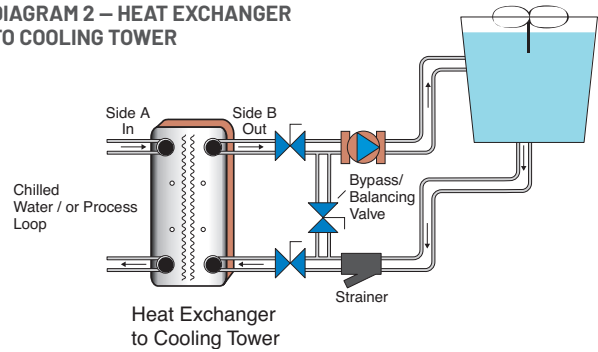
Optimum Approach Temperature for a Brazed Plate heat exchanger is typically 10°F for cost effective selections; however, 3°F and 4°F Approach Temperatures are possible for special applications.

Ideal Temperature Difference (TD) is typically 10°F and is preferred in many applications.

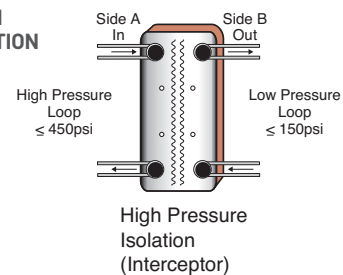
**DIAGRAM 1 – STANDARD PIPING ARRANGEMENT  
10°F AND HIGHER APPROACH**



**DIAGRAM 2 – HEAT EXCHANGER  
TO COOLING TOWER**



**DIAGRAM 3 – HIGH  
PRESSURE ISOLATION**



# MODEL AP ACCESSORIES

## MOUNTING BRACKETS

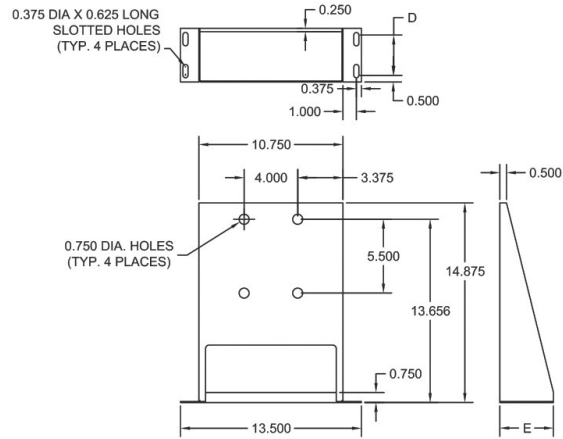
Mounting of any Brazed Plate unit can be accomplished by:

1. Using a bar across the face of the unit
2. Mounting to a steel strut
3. Using a mounting bracket. Mounting brackets are designed for easy use where applicable. BKT and FR models are all stainless steel.

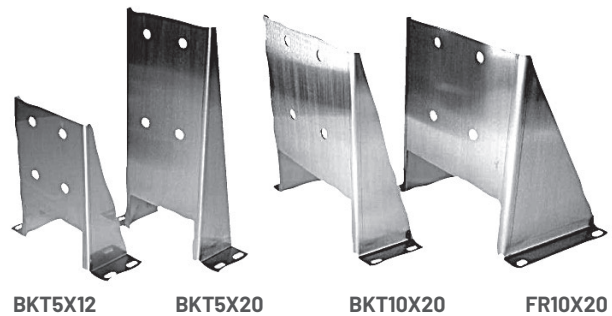
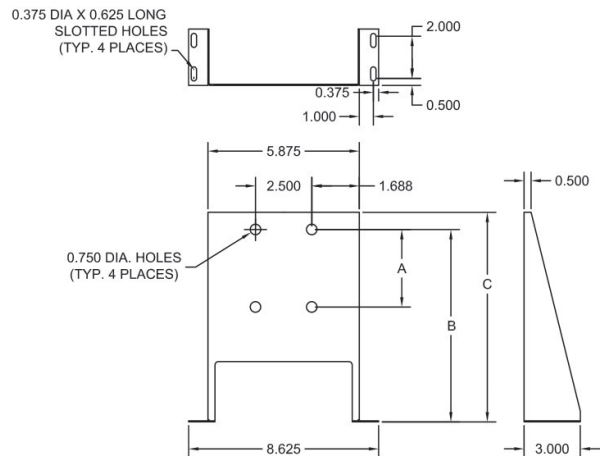
PART NUMBER	BKT10X20	FR10X20	BKT5X20	BKT5X12
Plate Count	10-100 PL	110-220 PL	All	All
A	-	-	5.500	3.500
B	-	-	13.625	8.625
C	-	-	14.875	9.750
D	3.000	7.000	-	-
E	4.000	8.000	-	-
MATL. TH'K	14 GA	10 GA	14 GA	14 GA
MATERIAL: SA-240, 304 SS				

BRACKET MODEL	TYPE
BKT5x12	Mounting Bracket for AP4H, APDW4, APSM05x12
BKT5x20	Mounting Bracket for AP57H, APDW5, APSM05x20
BKT10x20	Mounting Bracket for AP10H, APDW10, APSM010x20
FR10x20	Rugged Floor Mounting Frame for AP57H, APDW5, APSM05x20, 90-200 plates

## BKT10X20 AND FR10X20



## BKT5X12 AND BKT5X20





# MODEL AP ACCESSORIES

## "Y" STRAINERS

A water strainer is required for proper protection of the Brazed Plate fluid side for chillers, condensers and fluid-to-fluid units. These strainers are cast bronze, female pipe thread connections and rated for 400 psi working pressure at 150°F.



MODEL	FEMALE PIPE CONNECTION	MESH STRAINER	GPM AT 1 PSI PD	GPM AT 2 PSI PD
STR3/4	3/4" FPT	20 mesh	18	26
STR1	1" FPT	20 mesh	28	40
STR1-1/4	1-1/4" FPT	20 mesh	42	60
STR1-1/2	1-1/2" FPT	20 mesh	70	100
STR2	2" FPT	20 mesh	110	140
STR2-1/2	2-1/2" FPT	20 mesh	140	190
STR3	3" FPT	20 mesh	180	260
STR4	4" FPT	20 mesh	300	420

NOTE: Please contact Aurora Applications Engineering (NA\_applications@pentair.com) for higher working pressure models or stainless steel versions.

## ZINC ANODE

A zinc anode is required for all APSMO models used in swimming pools with electronic chlorinators and for ALL applications where galvanic corrosion is possible. A zinc anode is not provided with APSMO fluid-to-fluid models.

MODEL	FEMALE PIPE CONNECTION
ANODE 3/8	3/8" FPT



# REPLACEMENT HEAT EXCHANGERS

## MODEL AP – FOR REPLACEMENT HEAT EXCHANGERS

There are two simple ways to select a Brazed Plate Heat Exchanger to replace a Shell & Tube Heat Exchanger. Both methods provide exact or improved performance selection.

### METHOD A. HEAT TRANSFER SURFACE METHOD

This method uses a near exact way of matching the heat transfer surface area of the heat exchanger, which defines the nominal performance of the unit. Because Brazed Plate units perform 20%-80% better than Shell & Tube Heat Exchangers on a heat transfer surface basis, a 20%-80% safety factor is embedded in this method. This approach works for almost any type of fluid-to-fluid and steam-to-fluid heat exchangers.

**Step 1:** Count the number of tubes in the Shell & Tube Heat Exchanger. # of tubes = \_\_\_\_\_.

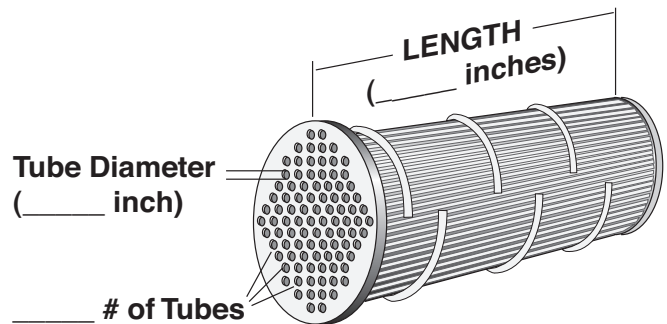
**Step 2:** Measure the external diameter of the tube(s). OD Diameter of bare tube is: (.25", .375", .5", .625", .75", .875" or \_\_\_\_\_). If the tubes have fins or protrusions, call your Aurora Pump sales representative.

**Step 3:** Measure the length of the tube(s) from end sheet to end sheet. Length of tubes = \_\_\_\_\_ inches. If U-tube bundle, use overall length of U-tube bundle.

**Step 4:** Multiply:  
#Tubes \_\_\_\_\_ x Diameter of tube \_\_\_\_\_(inches) x 3.14 x Tube Length \_\_\_\_\_(inches) x .0069 (ft<sup>2</sup>/in<sup>2</sup>) x 1.2 Safety factor = \_\_\_\_\_ Sq. Feet of Heat Transfer Surface.

**Step 5:** Select the corresponding Brazed Plate model based on the Sq. Feet column above.

**Step 6:** Installation – The fluid pressure drop of the new installation must closely match (+/- 20%) that of the former Shell & Tube installation so that the pump performance and fluid flow remain the same. Make sure bypass/balancing valves are installed on all fluid circuits to the heat exchanger (boiler and secondary side while excluding steam lines). Adjust for proper pressure drop across the heat exchanger, which should match the pressure drop across the (former) Shell & Tube heat exchanger.



# REPLACEMENT HEAT EXCHANGERS

## METHOD B. DESIGN CONDITION METHOD

The standard design and selection method of a heat exchanger is based on "Design Conditions." This heat exchanger can either be selected from one of the charts in the A-01-20-1000-1080 Selection Data pages or computer selected. The following information is required for a computer selection:

### Hot Side A

Fluid \_\_\_\_\_ (Water, or, %Glycol, or Fluid Type)  
 Temperature In \_\_\_\_\_ °F (or °C)  
 Temperature Out \_\_\_\_\_ °F (or °C)  
 Flow Rate \_\_\_\_\_ GPM (or L/min)  
 Fouling Factor (.0001 standard) Maximum Allowable  
 Pressure Drop \_\_\_\_\_ psig

### Cold Side B

Fluid \_\_\_\_\_ (Water, or, %Glycol, or Fluid Type)  
 Temperature In \_\_\_\_\_ °F (or °C)  
 Temperature Out \_\_\_\_\_ °F (or °C)  
 Flow Rate \_\_\_\_\_ GPM (or L/min)  
 Fouling Factor (.0001 standard) Maximum Allowable  
 Pressure Drop \_\_\_\_\_ psig  
 Total Heat Transfer \_\_\_\_\_ BTUH (or KW)

NOTE: The Brazed Plate unit will be 1/2 to 1/5 the size and weight of the Shell & Tube heat exchanger while still offering the same performance and design conditions.

HYDRONIC MODELS (AP4H)	SQUARE FEET SURFACE	HYDRONIC MODELS (AP57H)	SO FEET SURFACE
AP4H-8	2.3	AP57H-20	23.6
AP4H-10	3.1	AP57H-24	28.9
AP4H-12	3.8	AP57H-30	36.8
AP4H-14	4.6	AP57H-40	49.9
AP4H-16	5.4	AP57H-50	63.0
AP4H-20	6.9	AP57H-60	76.1
AP4H-24	8.4	AP57H-70	89.3
AP4H-30	10.7	AP57H-80	102.4
	10.7	AP57H-90	115.5
AP4H-36	13.0	AP57H-100	128.6
AP4H-40	14.6	AP57H-110	141.8
	14.6	AP57H-120	154.9
AP4H-50	18.4	AP57H-130	168.0
	18.4	AP57H-140	181.1
AP4H-60	22.2	AP57H-150	194.3
AP4H-70	26.1	AP57H-160	207.4
AP4H-80	29.9	AP57H-170	220.5
		AP57H-180	233.6
		AP57H-190	246.8
		AP57H-200	259.9

NOTE: For Steam, CuNi-Cupronickel and Brass Shell & Tube Replacements, or Swimming Pool water and installations with questionable water quality, substitute Aurora Pump APSMO series for the AP model number.

# YOUR PUMP PARTNER FOR THE WHOLE BUILDING

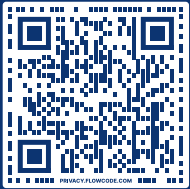


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Our extensive pump portfolio, crafted with a tradition of quality and excellence, has countless applications in commercial buildings. Whether it's fire suppression for safety or HVAC and boosting applications for comfort, your building is covered with dynamic water movement solutions that fit your needs.

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