



TriangleTube

Hot Water Specialists

BRAZED PLATE HEAT EXCHANGERS TTP SERIES INSTALLATION GUIDE

WARNING

Prior to installation and operation, read the entire guide completely. Failure to follow proper instructions can result in severe personal injury, death or substantial property damage.

CODE COMPLIANCE & RESTRICTIONS

- All piping and installations must conform with the instructions in this guide and where applicable:
 - Local, state, provincial, and national codes.
- Where recommendations in this guide differ from local, state or national codes, the local, state or national codes take precedence.
- The heat exchanger is a single wall exchanger and complies with National Standard Plumbing Code provided:
 - Boiler/primary water (including additives) is practically non-toxic, having toxicity rating or Class of 1 as listed in Clinical Toxicology of Commercial Products, and
 - Boiler/primary water pressure is limited to maximum 30psig by approved relief valve.

Single wall heat exchangers are permitted under Uniform Plumbing Code - Paragraphs L3.2 and L3.3 if they satisfy all of the following requirements:

1. The heat transfer medium is potable water or contains only substances, which are recognized as safe by the U.S. Food and Drug Administration.
2. The pressure of the heat transfer medium is maintained less than the normal minimum operating pressure of the potable water system.
3. The equipment is permanently labeled to indicate that only additives recognized as safe by the FDA shall be used in the heat transfer medium.

Operating Restrictions

Max. Operating Pressure ("E" model): 150 psig

Max. Operating Pressure: 450 psig

Max. Operating Temperature: 365°F

Min. Operating Temperature: (-)320°F

Plate Material: AISI 316 Stainless Steel

Brazing Material: 99.9% Copper

Water / Fluid Quality Restrictions

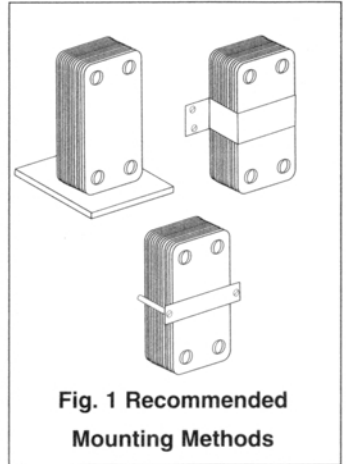
ph limit between 6 and 8

Chloride level less than 80 mg/L

Highly chlorinated water i.e. pool or spa applications

Mounting Heat Exchanger

- Heat exchanger should be mounted to allow sufficient clearances for servicing.
- The heat exchanger should be mounted in the vertical position with the color label on the left side of the exchanger. When space and/or piping restrictions require another mounting position, the following guidelines should apply:
 - In liquid to liquid applications the heat exchanger can be mounted in any position that does not permit entrapped air or gases within the exchanger.
 - For refrigerant and steam to water applications the heat exchanger **must** be mounted in a vertical position only.
- Never mount the heat exchanger with the connections facing downward in any application.
- Use brackets to support the heat exchanger when mounting.
- Install vibration absorbing material between the heat exchanger and the mounting brackets to prevent damage to the exchanger.



**Fig. 1 Recommended
Mounting Methods**

WARNING

Never support the heat exchanger solely by the piping. Insure the heat exchanger is insulated from any severe vibrations. Failure to mount the heat exchanger properly can result in severe personal injury, death or substantial property damage.

CAUTION

The heat exchanger may have sharp edges, exercise care in handling the exchanger during installation.

GENERAL PIPING

- Ensure all plumbing / piping meets or exceeds all local, state or national codes.
- Use isolation valves to isolate system components as required.
- Install union coupling for removal and servicing of the exchanger. Use dielectric unions when connecting dissimilar materials such as copper and galvanized iron pipe.

- Provisions should be made in the piping to allow for thermal expansion or vibration.
- Provision in the system piping should be made to allow for back flushing / chemical in-place cleaning, air elimination and draining of the system.
- To prevent fouling of the heat exchanger in harsh water conditions, a strainer with a minimum 16 to 20 mesh is recommended on the inlet connection.
- To prevent fouling from debris, it is recommended to flush all piping prior to connection to the exchanger.

WARNING

Blockage of the heat exchanger will lead to fouling or freezing of the heat exchanger resulting in severe personal injury, death or substantial property damage.

SOLDERING CONNECTIONS

Recommended soldering alloy: 30 - 55% silver

Recommended soldering alloy flow temperature: < 1200°F

- Ensure flux material is non-corrosive to the materials of the heat exchanger.
- Ensure the connections are clean, free of dirt and oils, prior to applying the flux material.
- Use a wet towel or other means of a heat sink wrapped around the heat exchanger and connection to prevent overheating.
- For refrigeration applications, flow dry nitrogen through the connections to prevent oxidation.

WELDING CONNECTIONS

- Prepare the edge of the connection piping with a 30° angle.
- Place the tapered piping into the exchanger connection and TIG or MIG weld the pipe to the connection, filling the groove formed by the two edges.
 - This method of welding minimizes the heat zone around the connection and exchanger.

WARNING

Do not heat the soldering / welding area higher than 1200°F. Damage to the heat exchanger brazing material could occur.

WARNING

When using electrical welding circuit, connect the ground terminal to the joint tube, do not connect to the back of the exchanger. Damage to the internal channels and brazing material of the exchanger could occur.

THREADED CONNECTIONS

- Use Teflon or Mylar tape or other sealant on the male threaded part of the heat exchanger connection to prevent leakage.
- Use a two-wrench method when installing piping connections to the exchanger connection to prevent over-torque stress and damage to the connection when tightening.

CLEANING AND MAINTENANCE

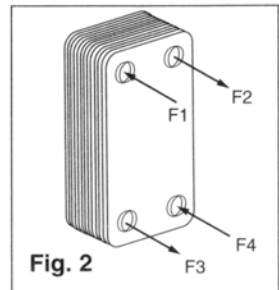
- The heat exchanger is typically maintenance free, requiring only routine cleaning as necessary.
- To clean the heat exchanger, reverse flush the exchanger with water or a mild organic acid (5% Phosphoric Acid or Oxalic Acid) solution. Ensure the flow rate of the flush is greater than the operating flow rate.
- Flush the heat exchanger with fresh water when the cleaning process is completed. A final rinse using a solution of 1 to 2% sodium hydroxide (NaOH) or sodium bicarbonate (NaHCO₃) ensures all acid is neutralized.
- When using a solution other than water, check with the solution manufacturer for compatibility to the exchanger's material and always follow the manufacturer's instructions on use.

WARNING

To prevent damage to the heat exchanger and refrigerant components, do not chemically clean the refrigerant circuit of the heat exchanger.

DOMESTIC WATER APPLICATIONS

- Typically the circuit with the highest temperature and/or pressure should be connected to the left side connections indicated by the color label.
- The circuit flows should be piped in a counter-flow arrangement.
- On instantaneous water heating applications (no available storage) a flow switch must be used to prevent overheating of the heat exchanger.



DANGER

HOT WATER CAN SCALD!

- Water temperatures over 125°F can cause severe burns instantly or death from scalds.
- Feel water before bathing.
- Consumer Product Safety Commission and some states recommend temperature settings of 130°F or less. Setting thermostat higher than 130°F will increase the risk of scald injury and cause personal injury or death.
- Water heated to a temperature suitable for clothes washing, dish washing and other sanitizing needs will scald and cause permanent injury.
- Children and elderly, infirm, or physically handicapped persons are more likely to be injured by hot water. Never leave them unattended in or near a bathtub. If anyone using hot water in the building fits this description, or if state laws or local codes require certain water temperature at hot water faucets, take special precautions:
 - Install an automatic mixing valve at the exchanger or at each hot water faucet, bath and shower.
 - Use the lowest practical temperature setting.
 - Check water temperature after any adjustments.

RADIANT AND SNOW MELT APPLICATIONS

- Typically the circuit with the highest temperature and/or pressure should be connected to the left side connections indicated by the color label.
- The circuit flows should be piped in a counter-flow arrangement.
- Use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended.

WARNING

Do not use automotive ethylene glycol or any undiluted or petroleum-based antifreeze. This can cause damage to the exchanger and system components resulting in severe personal injury, death or substantial property damage.

STEAM TO WATER APPLICATIONS

- Ensure the braze plate heat exchanger is mounted vertically to allow gravity drainage of the condensate.
- The installer should use "Good Steam Practices" which includes a steam trap below the unit and vacuum breakers.
- The steam circuit must enter the heat exchanger's top connection, with the condensate leaving the exchanger through the bottom connection.
- Provide steam traps at critical points i.e. in front of the control valve, to prevent "pooling" of condensate.

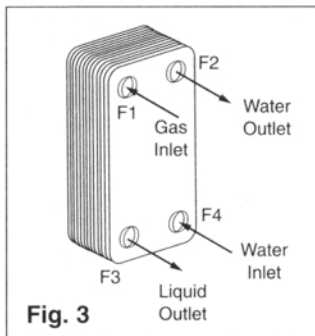
NOTICE

AVOID water hammering and other deformations caused by wet steam.

On low pressure steam systems or on applications with no-continuous processes, place traps prior to the control valve and other critical points in the steam distribution system.

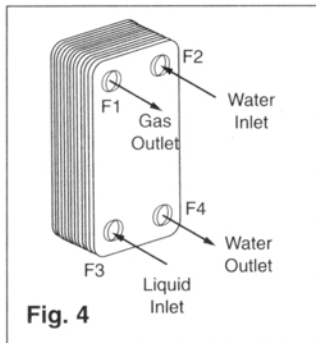
REFRIGERANT CONDENSER APPLICATIONS

- The heat exchanger must be mounted in the vertical position to allow gravity drainage of the condensate.
- The refrigerant gas must enter the heat exchanger on the left side (indicated by the color label) using the upper connection.
- The cooling water must enter the lower connection of the exchanger and exit from the upper right connection to maintain the counter-flow concept.



REFRIGERANT EVAPORATOR APPLICATIONS

- The heat exchanger must be mounted in the vertical position.
- The refrigerant gas/liquid mixture must enter the heat exchanger on the left side (indicated by the color label) using the lower connection.
- The water must enter the upper right connection of the exchanger and exit from the lower right connection to maintain the counter-flow concept.
- The thermal expansion valve should be placed close to the inlet connection of the heat exchanger. The thermal expansion valve sensing bulb should be placed on the refrigerant outlet approximately 12 to 24 inches from the heat exchanger.
- A pressure differential switch or flow switch must be installed to prevent possible freeze-up due to loss of water flow.



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