Ormandy Rycroft

Heating & Cooling Solutions

Brazed Plate Heat Exchanger

Operating & Instruction Manual

Standard duties
30 Bar(G) & 195°C

1. Description

The series of Brazed Plate Heat Exchangers are designed to achieve the maximum transfer of heat between two media of different temperatures, without allowing the media to mix.

The BPHE is constructed of several layers of baffled stainless steel plates. The unique stamping pattern of the baffled plates maximises the effectiveness of the heat transfer. The series, size and number of plates is dependent upon the specific heat transfer requirements of a particular application.

Plates within a Brazed Plate Heat Exchanger are made of AISI 316L (1.4404) stainless steel, pressed and joined to a plate pack and brazed with a 99.99% pure copper brazing agent, using a vacuum oven process. Each baffled stainless steel plate has an opening in each of the four corners.

During the manufacturing process of the BPHE units, every other baffled stainless steel plates is rotated 180° in order to create two distinct media chambers, or channels. These two distinct media channels allow for the asymmetric flow of media across a multitude of intersections created by the unique pattern of the baffled stainless steel plates, and causes high turbulence of the media flowing through the two distinct channels.

The result is a high heat transfer value, as well as a significant reduction of deposits on the plates from the media flowing through the unit, as compared to a shell and tube heat exchanger.

2. Application and Installation Considerations

The following points should be observed, to ensure the correct installation and operation of the series of Brazed Plate Heat Exchangers.

Because of the potential degradation of the copper brazed joins of the series of brazed plate heat exchangers, the following should not be used:

- Distilled water and media containing of forming NH3 (ammonia)
- Sulphur or sulphuric acid composition
- Media containing high levels of halogens (iodine, chlorine, bromine, fluorine, astatine)

Media with particulates and/or heavy solids are not appropriate for use with the BPHE, as they will cause clogging and early failure of the unit.

To avoid fatigue of the brazed joins and the potential of a failure, installations must be made in a manner to avoid pulsations and vibrations to the unit.

The unit must be installed and operated in a manner which limits bending and twisting torque on the connection ports to the maximums specified within this document.

Important Information

Do not weld on the BPHE. Welding current running through the unit will damage it. Failure of a unit due to welding on it, is **NOT** covered by our warranty.

Extreme care must be taken by the installer if pipe connections are soldered directly to the unit.

The temperature reached during the soldering process must not approach the melting point of the BPHE's internal brazing material. We advise that, where possible, soldered pipe connections should be made to a swivel female by sweat (solder) adaptor coupling, which can then be attached to the unit's male threaded port fittings. These adapter couplings are available from us.

Failure of a unit due to soldering or welding is **NOT** covered by our warranty.

In the event of operational shut down periods, in excess of approximately 100 hours, draining of both flow channels in the unit is strongly recommended in order to avoid stand still corrosion and clogging.

In installations with media of high calcium hardness, during a shutdown process, we recommend shutting down the warm flow channel first, in order to help prevent the build-up of calcium deposits on the surface of the plates within the unit. Calcium deposit fouling accelerates at temperatures above 140° F (60°C) and will reduce calcium deposits.

Periodic flushing and back-flushing of the unit is recommended when the unit is used with media of high calcium hardness.

With refrigerant applications, to avoid damaging the unit due to freezing, the refrigerant supply should be shut down before the secondary fluid is shut down.

The plate heat exchangers should be installed in a vertical position to provide draining of flow channels. See Fig. 1.

3. Installation

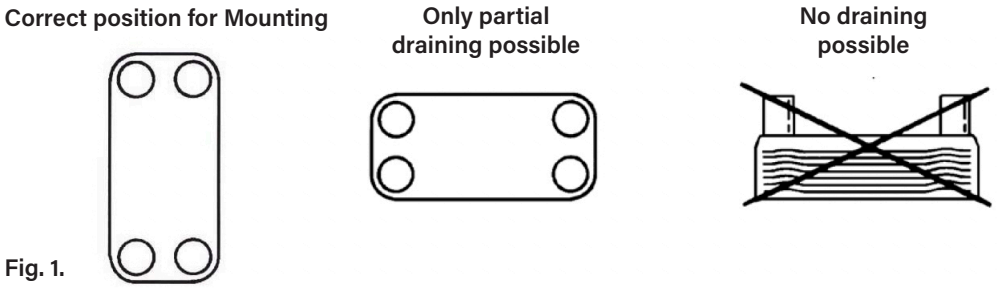

Fig. 1.

Do not exceed the maximum bending moment and torque specifications referenced in Tab. 1. Use of gasket or washer seating swivel female adapters is recommended.

Tab. 1. **Threaded Connection Torque Specifications**

BPHE Series	Port Size/Fitting	Bending Moment (ft/lbs)	Torque (ft/lbs)
B 23 32 46	G ¾ or ¾" NPT	26	110
13	G 1 or 1" NPT	26	110
53	G 1 ¼ or 1 ¼" NPT	45	265
75	G 1 ¾ or 2" NPT	515	700

4. Pipe Connections

The media must flow through the device in counter flow paths.

Every BPHE unit contains a product label, indentifying the connection ports and the required counter flow patterns of the media. Fig. 2 details these counter flow patterns.

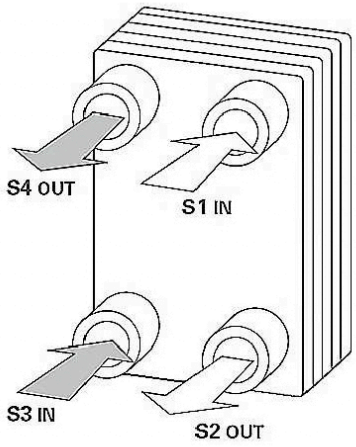

Fig. 2.

Installations employing smaller Brazed Plate Heat Exchangers (B 23, 32, 46, 13 Series) may be fastened directly to and supported by supply piping.

Installations employing larger Brazed Plate Exchangers (B 53 and B 75 Series) must be floor mounted, wall-mounted, shelf-mounted, or equipment-mounted in a manner that adequately supports the weight of the unit and flowing media without putting inordinate stress on the connection pots of the unit.

Wall and floor mounting brackets and associated hardware are available for the SSB 55 and SSB 60 Series.

Floor mounting brackets and transport handles are available for the B 75 Series.

Brazed Plate Heat Exchangers must be installed in a manner that avoids exposure to vibrations, pulsations, and thermal and hydraulic stresses. Proper system design may call for the use of flexible connectors, expansion loops and tanks, water hammer arrestors, slow-closing solenoid valves, and other equipment necessary to establish an application environment conducive to effective operation of the SSB, as well as other application components.

When the BPHE unit is standing upright, as shown in Fig. 1, piping must be installed in a manner to achieve the counter flow media.

For example, one media will enter the bottom left side of the unit and exit the top left side of the unit. The other media will enter the top right side of the unit and exit the bottom right side of the unit, as shown in Fig.2.

Either counter flow path configurations of media are acceptable. Please plan and implement your installation according to either of the flow paths shown in Fig.2.

Installation Considerations

Installation design should incorporate the use of shut-off valves in the supply piping. Additionally, vent valves should be provided to supply piping, feeding the top of the unit and drain valves should be provided for supply piping, feeding the bottom of the unit.

Before connecting the female pipe connections to the male threaded port connections on the BPHE, ensure that the threads and gaskets or washers are free of dirt and other particles which may affect successfully achieving leak-free connections.

Extreme care must be taken by the installer, if pipe connections are soldered directly to the unit. The temperature reached during the soldering process must not approach the melting point of the BPHE's internal brazing material. **The soldering flame must be held away from the BPHE.**

Use silver solder with a silver content of at least 45%. We advise that, where possible, soldered pipe connections be made to a swivel female by sweat (solder) adapter coupling, which can then be attached to the unit's male threaded port fittings.

As a rule, all plumbing pipes must be installed in a manner that keeps movement of the pipes and other plumbing components in the system from transferring bonding or twisting torque or stress to the BPHE.

Do not use the BPHE as a ground, when welding on a component in the system or in the vicinity of the unit.

5. Operation

Before stat-up, ensure that all threaded connection joints are tight. Also review the operating design specifications of all system components, such as pumps and boilers, to ensure that minimum and maximum temperatures and maximum pressures of other components of the system do not exeed those specified on the BPHE name plate.

6. Pumps

Supply pumps in the system should be equipped with control valves. Pumps producing pressures in excess of the specification parameters for the BPHE must be installed with safety or pressure reducing valves.

To avoid damaging the BPHE due to water hammer stress, supply pumps must not introduce air into the media flowing through the unit.

7. Start-Up

To avoid hydraulic stress to the BPHE, pumps should be started with closed valves. Where possible, the valves in the supply and return lines should be opened simultaneously and equally.

To avoid thermal stress to the BPHE, the media closest to ambient temperature of the BPHE should be introduced first to the unit, followed by the second media.

The flow rate should be increased slowly and not reach full flow, until normal operating temperatures are achieved.

8. Venting

During initial media flow through a drained or new unit, vent valves should be open to allow all trapped air to escape from the system.

Insufficiently vented BPHE units will not perform as designed, due to trapped air remaining in the system. Additionally, this trapped air will increase the risk of unit damage, due to water hammer corrosion

9. Shut Down

With heating applications, the warm flow should always be shut down prior to the cold side media flow. With refrigerant applications, the cold side media (refrigerant) should always be shut down prior to the warm side media flow. It is imperative to gradually shut down the media flow.

In the event of operational shut down periods in excess of approximately 100 hours, draining and cleaning of both flow channels in the unit is strongly recommended in order to avoid standstill corrosion and clogging. This is particularly critical in applications with aggressive and biological fouling media, as well as when the unit could be exposed to freezing temperatures.

10. Cleaning

BPHE units can be cleaned by flushing and back-flushing, in place, with chemical cleaners. Appropriate chemical cleanse should be selected, based upon the type of fouling to be removed, as well as the compatibility of the chemical cleaner to stainless steel and copper.

Increased pressure loss in the system may indicate the formation of deposits within the unit. This is especially true in applications using media which have a tendency to form deposits, such as calcium. Units unable to be successfully flushed and/or back - flushed may be the result of a complete fouling of the channels. If this occurs, the unit will require replacement.

The installation of circulating pumps in the system will result in the shorter cleaning times and improved cleaning performance. Flow of the circulating pumps need to be in the reverse direction of normal operating flows.

11. Spares

Please contact us regarding spare or replacement heat exchangers. We require the details from the name plate label to offer a direct replacement.

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