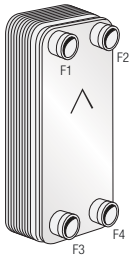
BPSW / BPW Series

General Information

Depending on material combinations, pressure ratings and functions, there are several different types of compact Brazed Plate Heat Exchangers (BPHEs). The standard materials are stainless steel, vacuum-brazed with a pure copper or nickel-based filler.

The basic materials of construction indicate the type of fluids that TTP's BPHEs can be used with. Typical examples are: synthetic or mineral oil, organic solvents, water (not seawater), glycol mixtures (ethylene and propylene glycol).

The front plate of TTP's BPHE is marked with an arrow. The purpose of this marker is to indicate the front side of the BPHE and the location of the inner and outer circuits/channels. With the arrow pointing up, the left side (Port F1, F3) is the inner circuit and the right side (Port F2, F4) is the outer circuit. For TTP asymmetric products one circuit is narrow while the other is wide, which makes it additionally important to correctly combine flow and circuit to reach design performance.



Ports F1/F2/F3/F4 are situated on the front of the heat exchanger.

Design Conditions

The standard pressure rating used for TTP BPHEs, i.e. for standard operating pressure, is maximum 450 PSI (3.1 MPa). TTP offers a wide range of pressure ratings based on applications, from low pressures (116 PSI) up to high pressures (2030 PSI). TTP's standard maximum operating temperature is 437°F for copper-brazed BPHEs, and 660°F for Nickel brazed BPHEs. However, as temperature and pressure are closely coupled, there is a possibility to increase the pressure if the temperature is reduced. For details, please check the label and other technical documentation.

Mounting

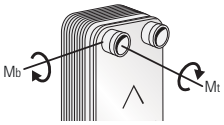
Never expose the unit to pulsations or excessive cyclic pressure or temperature changes. It is also important that no vibrations are transferred to the heat exchanger. If there is a risk of this, install vibration absorbers. For large connection diameters, we advise you to use an expanding device in the pipeline. It is also suggested that e.g. a rubber mounting strip should be used as a buffer between the BPHE and the mounting clamp.

In single-phase applications, e.g. water-to-water or water-to-oil, the mounting direction has little or no effect on the performance of the heat exchanger.

Connections

Allowable Connection Loads for Pipe Assembly Conditions

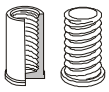
The maximum allowable connection loads given below are valid for low cycle fatigue. If high cycle fatigue is involved special analysis should be made.



Allowable connection loads for different pipe assembly conditions:

Pipe Size	Shear Force, F_s (lbf)	Tension Force, F_t (lbf)	Bending Moment, Mb (lbf* in)	Torque, Mt (lbf* in)
½"	787	562	177	310
¾"	2698	562	177	1018
1"	2518	899	398	1372
1¼"	3260	1461	774	2345
1½"	3709	2136	1372	3098
2"	4833	3035	2257	5310
2½"	10004	4047	3452	12834
3"	12447	4136	5089	21773

Allowable Loads for Stud Bolt Assembly Conditions



Mounting stud bolts, in different versions and locations, are available on the BPHEs as an option. These stud bolts are welded to the unit. The maximum allowable load on the stud bolts during assembly are stated below.

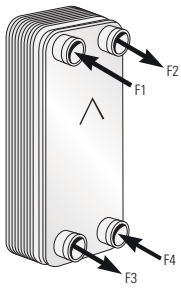
Allowable loads for different stud bolt assembly conditions:

Stud Bolt	Stress Area A_s (in²)	Tension Force F_t (lbf)	Torque M_t (lbfin)
M6	0.032	315	27
M8	0.053	585	71
M12	0.144	1349	239

Installation of BPHEs in Different Applications

Single-Phase Applications

Normally, the circuit with the highest temperature and/or pressure should be connected on the left side of the heat exchanger when the arrow is pointing upwards. For example, in a typical water-to-water application, the two fluids are connected in a counter-current flow, i.e. the hot water inlet in connection F1, outlet F3, cold water inlet F4, outlet F2. This is because the right-hand side of the heat exchanger contains one channel more than the left-hand side, and the hot medium is thus surrounded by the cold medium to prevent heat loss.



Water Strainer

A water strainer should be installed in the water inlet to protect the unit from particulate matter. 16-20 mesh minimum (20-40 mesh best choice).

Piping

Piping must be properly supported to prevent excess strain on the heat exchanger ports. Stainless steel is typically not satisfactory for salt water service.

Cleaning

In some applications, the fouling tendency could be very high; for example when using extremely hard water. It is always possible to clean the exchanger by circulating a cleaning liquid. Use a tank with a weak acid. 5% phosphoric acid, or if the exchanger is frequently cleaned, 5% oxalic acid. Pump the cleaning liquid through the exchanger. For optimum cleaning, the cleaning solution flow rate should be a minimum of 1.5 times normal flow rate, preferably in a backflush mode. Afterwards rinse with large amounts of fresh water in order to get rid of all the acid before starting up the system again. Clean at regular intervals.

Storage

BPHEs are to be stored dry. The temperature should not be below 34°F and not over 122°F for long term storage (more than 2 weeks).

Disclaimer

TTP's BPHE performance is based on installation, maintenance and operating conditions done in conformance with these instructions. TTP cannot assume any liability for BPHEs that do not meet these criteria.

The heat exchanger is not type-approved for fatigue loading.

ttp-sales@apiheattransfer.com +1.262.554.8330