AEL
HEATING SOLUTIONS
Telephone: 01928 579 068 for Technical Assistance

BRAZED PLATE HEAT EXCHANGER - INSTALLATION AND APPLICATION GUIDE

ATTENTION

Before proceeding with installation and operation read entire manual carefully. Failure to do so can cause injury or property damage. When receiving heat exchangers, any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee. AEL/TS heat exchangers may have some sharp edges so exercise caution when handling.

DESCRIPTION

AEL/TS Brazed plate heat exchangers consist of a pack of refined AISI 316L plates which are brazed together by copper or nickel in a furnace. When assembling the pack every second plate is turned 180° in the pane. There are two separate flow channels with two mediums in counter current.

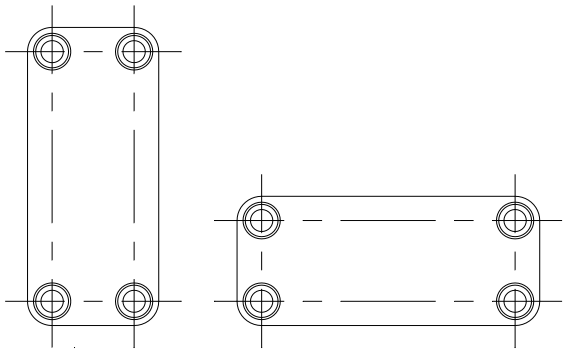
MATERIALS	
Plates	Stainless Steel 1.4401 AISI 316 Stainless Steel 1.4301 AISI 304*
Solder	Copper 99.99%

AEL/TS Brazed heat exchangers are designed according to TRB and AD rules and subjected to a test by TÜV in accordance with the Ordinance on Pressure Vessels. Each pressure vessel is subjected to an acceptance inspection item of process equipment in the works and on this a certificate is issued in accordance with TRB 521/522 on the correct and proper production and pressure testing. An official acceptance of the devices in accordance with the Ordinance on Pressure Vessels is not required. Production is performed in accordance with DIN ISO 9001.

MOUNTING POSITION

AEL/TS Brazed heat exchangers should be mounted so there is sufficient room around the heat exchanger to perform maintenance work. The fitting position is to be chosen in such a way that venting and draining of the exchanger are possible. For thermal applications a vertical fitting position is the most effective one. All other fitting positions can lead to power loss. For all two phase applications the heat exchanger should always be mounted vertically (Evaporator, condenser ...). *Never mount the heat exchanger with the connections pointing down.* Preferably the heat exchanger should be supported by a bracket or support. The unit should not be supported solely by the piping.

ATTENTION: mount and monitor a filter before the heat exchanger in order to prevent obstructions.



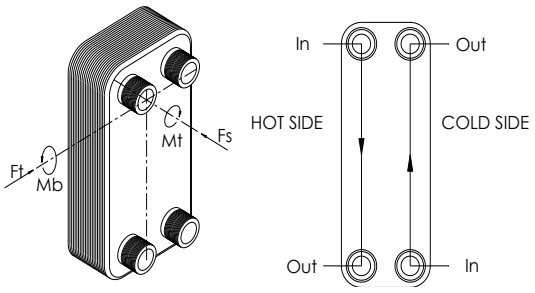
MODEL	TRHEADED (ISO G) x E [mm]	PN [bar]
AEL/TS F05	¾" x 20,1	31
AEL/TS F08	¾" x 20,1	31
AEL/TS F10T	1" x 45,0	31
AEL/TS F12	1 ¼" x 27,1	31
AEL/TS F15	¾" x 20,1	31
AEL/TS F16	1 ¼" x 45,0	31
AEL/TS F25T	1" x 45,0	31
AEL/TS F28	1 ¼" x 45,0	16
AEL/TS F35	2" x 54,2	31
AEL/TS F50	2 ½" x 27,1	31
AEL/TS F56	2 ½" x 54,2	31
AEL/TS F65	4" x 54,2	30
AEL/TS F120T	2" x 54,2	31
AEL/TS F427	4" x 54,2	28

MODEL	TRHEADED (ISO G) x E [mm]	PN [bar]
AEL/TS E05	¾" x 20,1	16
AEL/TS E06	¾" x 20,1	16
AEL/TS E08	¾" x 20,	16
AEL/TS E10T	1" x 45,0	16
AEL/TS E15	¾" x 20,1	16
AEL/TS E16	1 ¼" x 45,0	25
AEL/TS E25T	1" x 45,0	25
AEL/TS E28	1 ¼" x 27,0	25
AEL/TS E80*	1 ¼" x 27,0	25
AEL/TS E35	2" x 54,2	25
AEL/TS E120T	2" x 54,2	25
AEL/TS E50	2 ½" x 54,2	25
AEL/TS E56	2 ½" x 54,2	25
AEL/TS E427	4" x 54,2	25

*Plates AISI 304

The maximum connecting forces and torques are not to be exceeded, and have to be within the values shown below.

CONNECTIONS	Ft (kN)	Fs (kN)	Mb (Nm)	Mt (Nm)
G ¾"	2,5	12	20	115
G 1"	6,5	14,5	87,5	265
G 2 ½"	18	44,5	390	1450



PIPING CONNECIONS

In most applications the highest efficiency will be realized by connecting the heat exchanger for counter-current flow.

ATTENTION: Verify that vibrations and impulses are not transmitted to the exchangers, whose connections may brake. To avoid this drawback AEL/TS has reinforced the zone around connections, but we recommend to install systems capable of absorbing mechanical stresses between the heat exchangers and the vibration source.

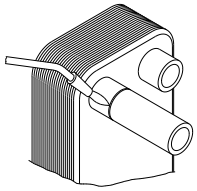
Studies on heating and district heating systems have proved that brazed heat exchanger's expected life reduces with wrong or inadequate regulation systems. Below are reported some principal factors having a negative influence on a brazed plate heat exchanger's expected life:

- Oversized regulating valves
- Excessive variations in system differential pressures
- regulating valves of poor quality
- incorrect regulator settings
- incorrect sensor placing

Before connecting pipes to the brazed heat exchangers on new or revised systems make sure to have cleaned carefully the surfaces and to have removed solids. We suggest the use of a filter with a 500 µ mesh, because in case of cooling systems occlusion of only one channel could lead to freezing with breaking risk and consequent mixing between water and cooling fluid.

WARNING: *the heat exchangers must not develop any darker annealing colours than "straw yellow" as otherwise there is a danger of corrosion. Do not exert any high forces and torques on the connection.*

Example of TIG or MIG soldering of a connection



SOLDERING CONNECTIONS

Clean the soldering assembly surface at the copper tube and heat exchanger connections. Polish the surfaces to remove oxides. Apply the flux to the surface. In order to prevent oxidation, the heat exchanger is to be protected from the inside with nitrogen N_2. Do not aim the flame in the direction of the heat exchanger, solder at a maximum temperature of 650°C (1200°F). Soldering material must be 45-55% silver filler for brazing. Use a wet rag to prevent overheating of the heat exchanger. Hold the tube in a fixed position during soldering. Use TIG or MIG welding.

Warning: *Excessive heating can lead to fusion of the copper and thus to the destruction of the heat exchanger!*

THREADED CONNECTIONS

Mount the heat exchanger and then connect the pipes to the heat exchanger by means of the threaded connections. To screw down the connection respect values reported in the table in the mounting paragraph.

BEFORE PUTTING INTO OPERATION

Before putting into operation it is to be checked to ensure that the operation data shown on the nameplate are not exceeded. The pumps feeding the heat exchanger must be equipped with "shut-off" valves. Pumps which generate higher pressures than stated for the device must be fitted with safety values. The pumps must not aspirate any air so that no disruptions of operation due to water hammer occur. In order to avoid pressure surges, the pumps are to be started up against closed valves. The valves in the supply and return lines are to be opened slowly and, as far as possible, simultaneously, until the service temperature is reached. Pressure surges are to be avoided. During filling the device is to be vented via the vent valves located in the piping. Inadequately vented heat exchangers do not yield their full performance as the complete heating surface is not available. Remaining air increases the danger of corrosion. Shutdown must be effected slowly and simultaneously for both sides (primary and secondary sides). If this is not possible, the hot side is to be shutdown first. For a relatively long downtime of the plant the heat exchanger is to be completely drained and cleaned. This applies in particular when there is a danger of frost, in the case of aggressive fluids and fluids which have a biological fouling tendency.

IN OPERATION

After the device has been put into service it is to be checked to ensure that no pressure pulsations are acting on the device. If the heat exchanger is fitted between a control valve and a differential pressure regulator, it is to be ensured that with simultaneous closing of both regulating devices no negative pressure can form and thus steam hammers are avoided. In district heating systems particular attention is to be paid to the fact that the secondary pressure maintaining system is designed for the maximum district heating supply temperature. Otherwise steam hammers can occur in the part-load range. Check the functional efficiency of the control devices

(cf. connection to the piping network). It is generally to be ensured that no operating conditions can arise which are contradictory to these assembly, operating and maintenance instructions.

Warning: *Steam hammers and pressure surges can lead to leaks in the heat exchanger. Adequate equipotential bonding is to be ensured in order not to endanger the corrosion-proofing.*

ANTI - FREEZE

Icing results in the destruction of the heat exchanger. At temperatures close to the freezing point anti-freeze agents (e.g. glycol) are to be used. For the fitting of temperature sensor the fitting of the heat exchanger with a ½'' internal thread socket is possible. These can be arranged opposite the primary or secondary connection.

FOULING

Many different factors can influence fouling. One of the most effective ways to prevent occlusion of the brazed plate heat exchangers is the use of hydraulic filters with a 0,5 or 0,8 mm mesh. The fluids are to be moved at the highest possible mass flows. In the event of excessively low mass flows (part load) the turbolence in the heat exchanger can decrease and the fouling tendency increase. Calcium deposits on the heat exchanger surface can occur at temperatures above 60°C. Turbolent flow and lower temperatures reduce the risk of calcification. During shutdown of the unit is to be ensured that first the primary side and the secondary side is closed. During start-up first the secondary side and then the primary side is opened. In that way overheating of the heat exchanger is avoided.

Warning: *Poor water quality leads to a higher susceptibility to corrosion.*

CLEANING

Should formation of deposits due to the water quality (e.g. high degrees of hardness or severe fouling) be expected, cleaning is to be carried out at regular intervals, for example by means of rinsing. Rinse the heat exchanger against the normal flow direction with a suitable cleaning solution. Only the cleansing agents offered by the relevant companies for cleaning stainless steel and copper are to be used.

Warning: *for cleaning of stainless steel, copper or nickel only light acids are to be used, in low water concentrations, compatible with the materials.*

GUARANTEE

The guarantee validity is 24 months from the delivery, unless otherwise reported within the purchase contract.
In case of operation problems, please contact AEL Tel: 01928 579 068.

Noncompliance with the instruction and notices constitutes a condition of improper use of the equipment both for operation and for the safety of the personnel authorized and non-authorized, thus releases AEL/TS from any responsibility for any accident causing injury, loss etc. to people and/or damage to goods, including the plate heat exchangers and furthermore causes the immediate expiration of the guarantee.

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