

## Heat exchanger plates



The heat exchanger plate has the function to enable the transfer of heat between two fluids with different chemical-physical features, with no mixing between them. These, are preferred compared to shell and tube exchangers, spiral, etc. in applications where there are important factors such as:

- Durability in time (guaranteed by the total inspection)
- Ability to change in future the performances through the addition or removal of intermediate plates
- Compact size
- Conditions of heat exchange to the physical limit (temperature difference of only 0.5° C)

The heat exchanger plate is built in compliance with the PED (97/23/EC) relating to pressure equipment.

### Use of the heat exchanger plate:

**Heating systems:** mainly used as a separator between hydraulic fluids technicians with different pressures or different chemical characteristics;

**Production of Sanitary Hot Water:** the selection of plates in stainless steel AISI 316L make it suitable for use with Sanitary Hot Water. In this area you can use it as a producer or instant SHW or joined to an accumulation of SHW in systems where consumption is concentrated in a few periods of the day (gyms, hotels, resorts, etc.). An important advantage in these applications is the reduction of legionella risk because the amount of water at low temperature is practically nothing.

**Heating of pool water:** the selection of plates in stainless steel AISI 316L with EPDM seals in the heat exchanger, make it suitable for use for the heating of the pool in the summer: the ideal solution for the disposal of excess heat generated by solar systems. With high concentrations of chlorine it is suggested the use of plates in Titanium.

**Refrigeration:** the high thermal efficiency of the plates can offer the best performance among the circuits where temperatures deviate only a few degrees.

**Maintaining existing plants:** often used in the replacement of heat exchange systems obsolete or undersized.

The heat exchanger plate is available in two different types: **INSPECTABLE** (pag. 175) and **BRAZED** (pag. 188).

At page 178 there is a table showing the compatibility of the seals, and connections of the heat exchanger plates with some of the most common thermal fluids.

From pag. 193 to pag. 199 there are tables with the thermal performance of heat exchangers in some working conditions; these can be a good reference in choosing the model.

The T.M.L. is able to size any type of heat exchanger thanks to a dedicated software capable of simulating all operating conditions.

Page 241 shows a reference module that can be of help for the definition of the necessary data for correct sizing of the heat exchanger. The form can be sent to our Technical Department which will try to bring the solution closer to the customer needs.

# Gasketed plate heat exchanger

This type of plate heat exchanger can be totally disassembled and reassembled, for inspection, maintenance or addition of plates.

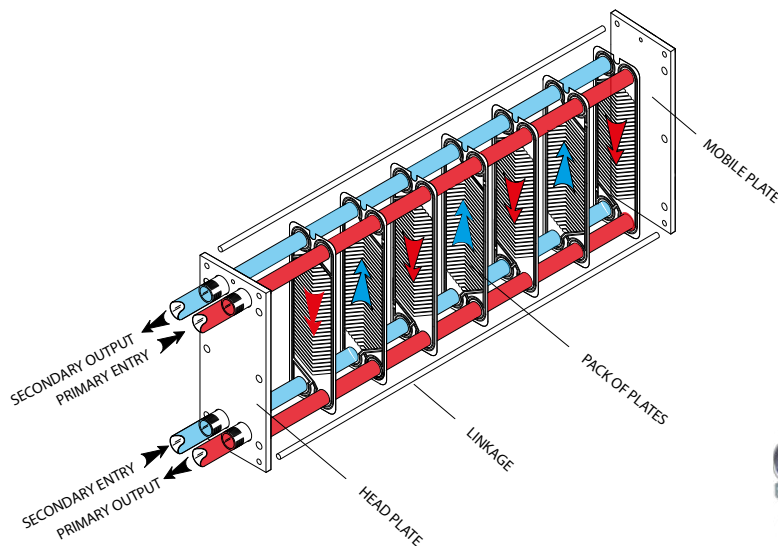
The main components of the plate heat exchanger can be inspected are: the frame, the plates and the gaskets.

- **the frame:** made of painted carbon steel heavy thickness consisting of a fixed plate that houses the connections and if necessary a mobile runs on special guides. The frame is clamped by means of galvanized linkage with high mechanical resistance, in order to guarantee the correct seal of the gaskets interposed in pack of plates.

- **the plates:** they represent the fundamental part of the exchanger, are obtained for cold rolling of stainless steel AISI 304, 316L and Titanium. The mold imparts to the plates a roughness that in addition to providing a better mechanical resistance to pressure, causes a turbulence of the fluid which bathes the benefit of the efficiency

of exchange. There are two different profiles of roughness of the plates: one that assures a higher exchange efficiency and one that guarantees a low load loss of the circulating fluid. The two types can be combined together in order to optimize the final performance of the exchanger.

- **the gaskets:** made of elastomeric material with high elasticity, which ensures excellent thermal shock resistance and a hydraulic seal constant over time; the types of material are: Nitrile (range of temp.  $-20^{\circ}\text{C} \div 120^{\circ}\text{C}$ ), EPDM (range of temp.  $-15^{\circ}\text{C} \div 150^{\circ}\text{C}$ ); VITON (range of temp.  $-10^{\circ}\text{C}$  to  $180^{\circ}\text{C}$ ). The seal is fixed mechanically (without the use of glues) by means of hooks peripheral that make it integral with the plate, greatly facilitating the assembly phase.



## “Fluid-exchanger” compatibility chart

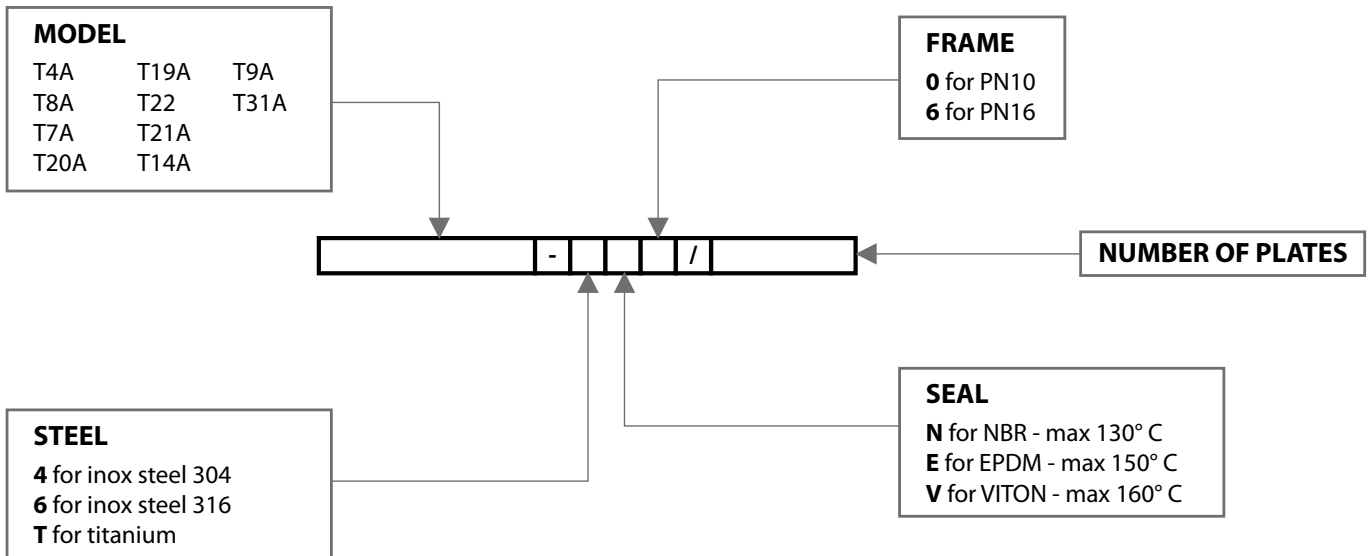
	Plates			Seal			Connections		
	Inox 304	Inox 316	Titanium	Nitril (NBR)	EPDM	Viton	Inox 316	Moplen	Flanged
Water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Glycoled water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Demineralized water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Thermal water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Salt water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Swimming pool water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Mineral water	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Steam < 3 bar	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Steam < 8 bar	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Hydraulic oil	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Heat transfer oil	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Quenching oil	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Mineral oil	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Cooking oil	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Oil/Gas	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Sulfuric acid 20% at 70° C	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
10% hydrochloric acid at 30° C	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Chromic acid 40% at 50° C	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Acetone	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Ethyl alcohol	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Ethanol	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Methanol	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Propylene	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Etylene	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Fruit juice	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Milk	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Wine/Beer	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

 Compatible

 Non compatible

## METHOD OF READING THE CODE OF THE INSPECTABLE PLATE EXCHANGER

Here below is the criterion used to dial the code of a plate heat exchanger for inspection:



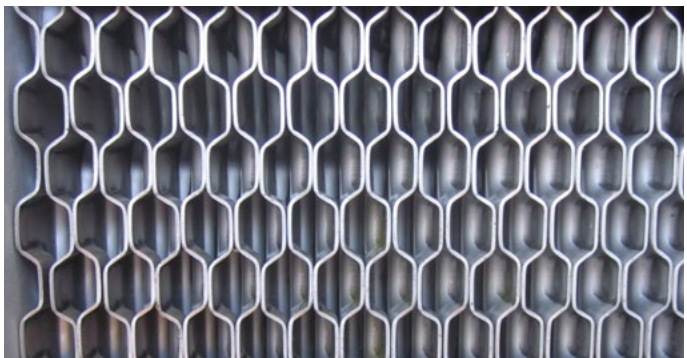
Example: An inspected plate exchanger Model T7A with 22 plates in stainless steel AISI 316, frame PN 16 and NBR seals will have a code: T7A-6N6/22 and will have a list price equal to:

List Price plate in stainless steel AISI 316 NBR: - € / each

List price frame T7A: € -

**List Price exchanger: -**

The T.M.L. srl, thanks to the use of a personalized calculation software, is able to size the plate heat exchanger more suitable to the specific demands of the customer. At page 241 is available a module that summarizes the data necessary for the correct sizing of the plate exchanger.



Heat exchanger plates

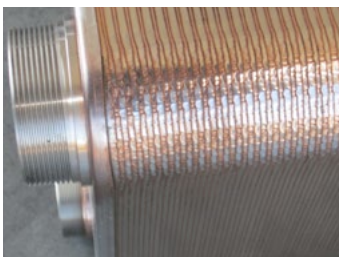
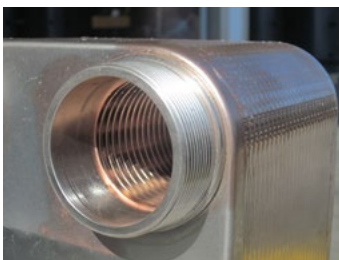
In the following pages we show the technical and dimensional characteristics of the various models of inspected heat exchanger plates the TML offers.

## Brazed plate heat exchanger



This type of heat exchanger is made by overlapping steel plates nox AISI 316L arranged at 180° one from the other so as to determine many small contact points in the intersection of the corrugations contiguous. The plates are made integral with each other by brazing (generally copper) and cooled within a vacuum furnace, the melting temperature of the brazing material; by capillary action the brazing material will wrap at the interface of all the contact points of the internal and external. This particularity explains the exceptional mechanical strength at high pressures of this type of exchanger. The main advantages of brazed heat exchangers are:

- At constant exchange surface it appears to be less bulky and lighter;
- Greater heat transfer coefficient due to a better exploitation of the surface and with a lower water content in the channels;
- Excellent resistance to high pressures and temperatures, thanks to the mechanical resistance generated by the internal and external welds that create a body alveolar compact;
- The effect of high turbulence within the channels leads to a reduction of the risk of clogging due to possible deposits of materials contained in the liquids (sand, mud, etc.).
- Cheaper than other types of heat exchangers.



In the following pages we show the technical and dimensional characteristics of the various models of brazed plate heat exchanger that TML offers.