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板式热交换器使用说明书
Plate Heat Exchangers Operation Manual

四平市巨元瀚洋板式换热器有限公司

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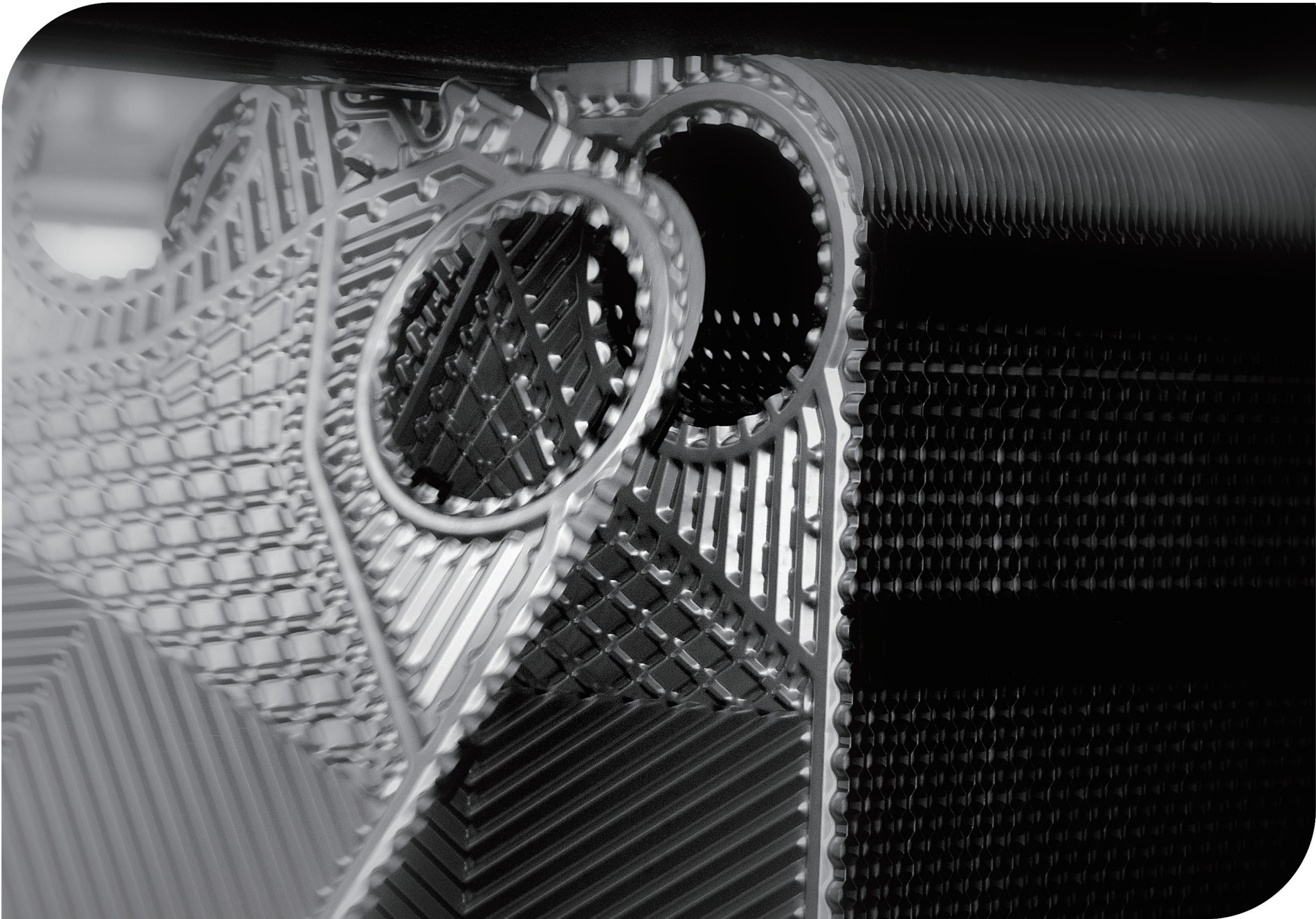
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THT巨元是全球领先的换热系统集成服务商之一。一直为致力于改善和提高人类的生活环境而不断努力，专注于与使用商建立长期的合作伙伴关系。我们拥有热诚的员工和强大的研发能力，快速响应客户需求，提供客户化产品和端到端的服务，助力客户商业成功。

THT巨元的产品有:可拆式板式热交换器、管壳式热交换器、空冷式热交换器、全焊式宽通道板式热交换器、板框式热交换器、板壳式热交换器、板式热交换器机组。

THT巨元现拥有年产板式热交换器100万m²、管式热交换器5000吨、机组5000台套生产能力，累计拥有70余项国家专利，120余种不同波纹形式的规格板型产品。

THT巨元产品被广泛应用于电力、核能、钢铁、冶金、石油、化工、船舶、供暖、轻工等多个行业领域，业务辐射31个国家和地区。其中为大亚湾、三门、田湾核电站等提供换热产品的成功应用，标志着THT巨元产品达到国际先进水平。

THT巨元拥有中国民用核安全设备设计和制造许可证，板式热交换器产品安全注册证（A1-A6级，B2-B3级），板式热交换器节能注册证（1-3）级，D级压力容器设计和制造许可证，SCADA自动控制系统著作权登记证，ASME认证、AHRI认证，通过了质量、环境和职业健康安全管理体系的“三标一体”认证。所有产品均通过国家热交换产品质量监督检验中心检测。

THT巨元始终致力于产品升级、技术革新和服务优化。每一位THT巨元人都旨在把THT巨元建设成具有国际竞争力的现代型企业。

① 打造中国换热器第一品牌

THT is one of the leading global supplier of heat transfer solutions. We have been committed to improving the living environment of mankind, focusing on establishing the long-term partnership with the users. We have dedicated employees and strong R&D capability, responding swiftly to the clients' demands, providing customized products and full service to facilitate our clients' business success.

THT products include plate heat exchanger, shell & tube heat exchanger, air cooled heat exchanger, wide gap welded PHE, block type heat exchanger, plate & shell heat exchanger and heat-exchange balance unit.

Nowadays, THT can manufacture 1,000,000m² plate heat exchangers, 5,000t tubular heat exchangers, 5000 heat exchange balance unit every year. THT hold 70 items of patent right and 120 kinds of different waveform and specifications. Besides.

THT products are widely used in many fields such as electric power, nuclear power, iron and steel, metallurgy, petroleum, chemical, shipbuilding, heat supply and light industry. THT's business covers more than 31 countries and regions. The successful application that THT provides heat exchange products for Daya Bay Nuclear Power Plant and Tianwan nuclear power plant represents that THT products have reach advanced world standard.

It has China civil nuclear safety equipment design and manufacturing license, plate heat exchanger product safety registration certificate (A1-A6, B2-B3), plate heat exchanger energy-saving registration certificate (1-3), D pressure vessel design and manufacturing license, SCADA automatic control system copyright registration certificate, ASME certification, AHRI certification, and passed the "three standards system" certification of quality, environment and occupational health and safety management system. All products have passed the inspection of the National Heat Exchange Product Quality Supervision and Inspection Center.

THT has always been applied itself to product upgrading, technological innovation and service improvement. All THT people are trying their best to build THT into a modern enterprise with international competitiveness.

⚠️ 特别提示：设备在安装、使用、维护、运输过程中应注意安全，严禁违规操作，避免发生意外人身伤害事故。

为了更好地使用THT产品，并得到良好的维护与保养，请您仔细阅读本说明书。

特点

THT巨元板式热交换器是一种具有传热效率高、结构紧凑、操作灵活、维修、清洗方便等特点的换热设备，主要用于加热、冷却、蒸发、冷凝、杀菌消毒、热力回收等场合，是目前最高效节能的换热设备。

THT不断进行技术创新和新产品研发，采用先进的计算机辅助设计及制造系统，进行板型开发设计及模具制造；采用HTRI等选型软件进行设备选型，保证提供的板式热交换器产品能适应各种工艺条件及特殊工艺过程。

工作原理

板式热交换器是由许多压制成型的波纹金属薄板片按一定的间隔，四周用垫片密封，并通过框架和夹紧螺栓压紧而成。板片和垫片的四个角孔形成了流体的分配管和汇集管，同时又合理地将冷热流体进行自由导流分配，通过板片传递实现热量交换功能。

结构

板式换热器由传热板片、密封垫片、上下横梁、支架、固定板、活动板和夹紧螺栓等基本元件构成。

板式热交换器系列图表(见插页)

THT巨元

⚠️ Special Note: Equipment installation, use, maintenance, transportation should pay attention to safety, the illegal operations is strictly prohibited to avoid the accidents of personal injury.

In order to use THT products better, and get good care and maintenance, please read this manual carefully

Features

The feature of THT's plate heat exchanger is high heat transfer efficiency, compact structure, flexible operation, maintenance, the heat exchanger equipment of convenient cleaning and mainly for heating, cooling, evaporation, condensation, disinfection, heat recovery and so on, is the most efficient and the energy saving heat transfer equipment.

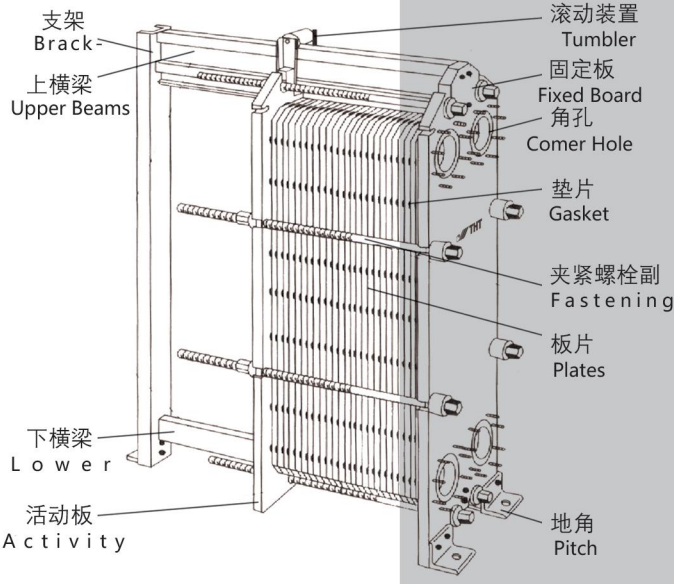
THT continuously implements the technological innovation and new product development, and applies advanced computer-aided design and manufacturing systems, implementing plate development and design and mold manufacturing; using the selection software of HTRI, such as the selection of equipment to ensure that the plate heat exchanger to provide products to meet the various process conditions and special process.

Work Principle

Plate heat exchanger is composed of many pressing of corrugated sheet metal pieces at regular intervals, around is the sealing gaskets and being pressed together through the frame and clamping bolts. The four corners of plates and gaskets form a fluid distribution hole pipe and manifold, while reasonably distributing the free diversion of the hot and cold fluids, passing through the plate to achieve the function of heat exchange.

Structure

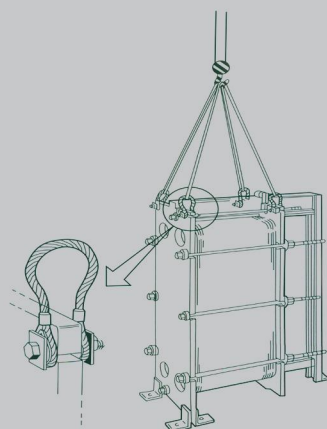
Plate heat exchanger is composed of the heat transfer plates, sealing gaskets, upper and lower beams, brackets, fixed board, activity board, the clamping bolts and other basic components,



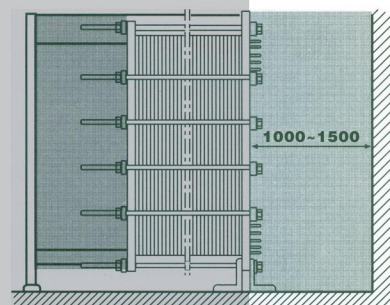
为人们创造更美好生活 ②

安 装

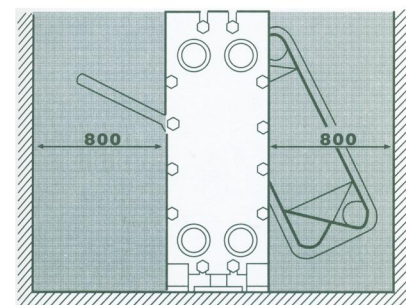
- 1、设备开箱后，应按照装箱单逐项核对，发现不符请立即与THT联系。
- 2、安装起吊时，要注意标牌上所标质量，选用合适的起吊用具。如图一
- 3、设备布置时周围应留有1~1.5m的活动空间作为通道和将来检修之用。如图二
- 4、设备应直立安装，安装前，应将进出口管道清洗干净，防止砂石、油污、焊渣等杂物进入设备，以免造成堵塞和损伤板片。如图三
- 5、冷热介质进出管路应设置流量调节装置，应安装压力及温度检测仪表以及关断阀等。
- 6、连接管路中应设置带有阀门的旁通管路，在管路系统清洗时，防止铁锈、泥沙等杂质进入循环系统，以免对设备造成损害。
- 7、管路系统中应设有排气阀，运行后应排净设备中的空气，防止空气停留在设备中，影响传热效果。
- 8、用户必须按介质指示牌连接管路，应视介质所含颗粒大小情况，必要时在介质进口处安装相应的过滤装置，以防止热交换器流道堵塞。
- 9、当介质为蒸汽时，入口前应设置能自动关闭的电动温控阀，以防止意外停电时，热交换器过热，损害密封垫。
- 10、为防止冷介质在被加热过程中膨胀超压，应在管路系统中设置自动泄压装置。
- 11、在活动压紧板一侧有接管联结时，配管应考虑设有90度可拆卸弯头或短接，以保证活动压紧板可以拆开进行检查和清洗。
- 12、在靠近板式热交换器处进行管道焊接时，应采取可靠的接地措施，严禁将板式换热器作为电焊负极，以防止电弧击穿板片。



图一



图二



图三

Installation

1. After the equipment is out of the box, it should be checked one by one according to packing lists. When the discrepancies are found, please contact with THT.
2. When implementing the installation of lifting, we should pay attention to signs on the standard quality, choose the appropriate lifting equipment. Figure I
3. When implementing the equipment layout, around 1~1.5m of space should be left for access and the use of future maintenance. Figure II
4. The equipment should be installed upright. Before the installation, import and export pipelines should be cleaned to prevent the gravel, grease, welding slag and other debris into the device, so as to avoid congestion and damage plate. Figure III
5. When the hot and cold media flows in and out of pipes, the control devices should be set, and the pressure and temperature instrumentation and shut-off valve should be installed.
6. The connecting pipe should be set in the bypass pipe with the valve, and the pipe system is cleaned to prevent rust, sediment and other impurities into the circulatory system and to avoid equipment damage.
7. The piping system should be equipped with exhaust valve, drain equipment should be running in the air to prevent the air from staying in the device and affecting the heat transfer.
8. The user must connect pipe by the media sign, the media which contains the particle size should be considered, if necessary, the appropriate filter is installed in the import of media to prevent the plug flow of heat exchanger.
9. When the medium is steam, the electric control valve should be set to the entrance, which automatically turn off and turn on to prevent accidental power outage, the heat exchanger overheating and the damage of seals.
10. The automatic pressure relief device should be set in the piping system to prevent the overpressure and the expansion of cold medium in the process of heating.
11. When the side of activities pressing plate has the over link, the pipe should be considered with removable elbow 90 degrees or shorted to ensure that the activities of the pressing plate can be opened for inspection and cleaning.
12. When implementing the pipe welding near the plate heat exchanger, the pipe welding should be taken to a reliable grounding, and the plate heat exchanger is strictly prohibited to be used as a welded negative in order to prevent the arc from breaking through plate.

使 用

- 1、设备运行前，应用铁刷刷净夹紧螺栓的螺纹处，并刷一薄层润滑油，检查其是否松动；如有松动，应均匀拧紧，并注意保证两压紧板平行，夹紧后的尺寸参考“产品合格证”相关数据。
- 2、开车注意事项：
 - a 首次启动或长期停止运行后再次启动热交换器时，应注意板束是否达到夹紧尺寸 L 的要求。
 - b 设备运行前，冷、热侧介质进口阀门应关闭，出口阀门应开启；启动后，缓缓打开热交换器前入口阀门，使两侧的温度和压力缓慢上升。
 - c 对用水蒸汽作为加热介质的，在被加热介质进入换热器后，再通入蒸汽。
 - d 在向设备注入流体时应打开排气阀，排净管路中的空气后关闭。
 - e 对于装有新乙丙橡胶密封垫片的板式热交换器，初次开车时升温速度要慢。
 - f 板式换热器对热、冷冲击十分敏感，因此对任何流速的调整都应缓慢进行，以免对系统产生冲击。
- 3、根据热交换器进出口仪表指示，用调节阀来调节冷热介质流量，达到工艺要求后稳定运行。在使用过程中，应做好压力、温度参数记录。当使用一段时间后，温度、压力有明显的与初期运行不一致（传热能力降低，压降增大）时应进行清洗。
- 4、停车注意事项：
 - a 设备停止运行时，先缓慢关闭热介质进口阀门，再缓慢关闭冷介质进口阀门，最后关闭冷、热侧介质出口阀门。
 - b 阀门关闭后，停止泵运行。板式热交换器对压力冲击很敏感，尤其关闭流体时，要绝对平缓地进行，防止产生压力冲击，也就是“水锤”现象。
- 5、设备拆卸注意事项：
 - a 拆卸热交换器前应使其冷却。
 - b 测量并记录金属板片束的夹紧尺寸 L。
 - c 如果在活动压紧板上有连接接管，首先应卸下与活动压紧板相联结的所有弯管或短接，使活动压紧板可以在上导杆自由滑动。
 - d 交替、呈对角线组对逐步松开夹紧螺栓，以保证活动压紧板的平行移动。
- 6、在使用过程中，当信号孔有流体流出或发生外渗漏时，应及时与我公司联系。

Use

1. Before the operation of equipment, to use iron brush to brush the clamping bolt thread Department, and brush a thin layer of oil, check for loose; if loose, should be evenly tightened, and attention to ensure that the two parallel compression plate, clip Compact size should follow the reference data of manufacturer certificate
2. Drive Note:
 - a. When firstly starting the heat exchanger or starting again after a long stop running, should pay attention to whether the clamping plate beam size should meet L requirements.
 - b. Before the equipment operation, the cold and hot side of medium inlet valve should be closed, outlet valve should be opened. After starting, slowly open the front entrance of heat exchanger valve so that the temperature and pressure both sides rise slowly.
 - c. For water vapor as a heating medium, the heated medium is put into the heat exchanger, then pass the steam into it When
 - d. The fluid is put into the device, exhaust valve should be open and drain the pipes in the air after the close.
 - e. For the heat exchanger with new gaskets of ethylene propylene rubber seal, heating should slow during the initial drive.
 - f. Plate heat exchanger is sensitive to heat, cold shock, so any adjustments to flow rate should be slow to avoid an impact on the system.
3. According to the import and export instruments of heat exchanger, using a control valve to adjust the flow of hot and cold media to achieve stable operation after the process requirements. During the process of use, the pressure and temperature should be recorded. When using a period of time, temperature, pressure obviously are inconsistent with the initial operation (ability to reduce heat transfer, pressure drop increases) it should be cleaned.
4. Parking Note:
 - a. When the device stops running, slowly close the first heat medium inlet, and then slowly close the inlet valve of cold medium, and finally close the outlet valve of the cold and hot side of the media.
 - b. When the valve is closed, stopping pump operation, the plate heat exchanger is very sensitive to the pressure impact, especially when closing the fluid, it should be carried out absolutely flat, preventing pressure shock, which is 《water hammer》 phenomenon.
5. Device removal Note:
 - a. Before demolition, the heat exchanger should be cooled.
 - b. measuring and recording the clamping metal plate beam size L.
 - c. If the active compression board has connection over Firstly all the elbow or shorted with compression plate of activities should be removed so that activities of compression plate can slide freely on the guide bar.
 - d. Alternating diagonal group gradually loosens the clamping bolt to ensure that the compression plates should be in the active ties in parallel.
6. During the process of use, when the fluid flow or leakage have occurred in the signal holes outside, should link with our company.

清 洗

板式热交换器清洗分为在线清洗与拆机清洗两种方式。

1、CIP在线清洗

化学清洗应逆向反冲洗，清洗液体流速为正常介质流速的1.5倍左右，清洗干净后，应用清水置换清洗液，直到完全排出清洗液为止。对于污垢层比较坚硬又较厚的情况，可先用化学清洗法软化垢层，然后再进行表面清洗。

不同的污垢应采用不同的化学清洗液，除采用稀释纯碱溶液外，对于水垢可用5%的硝酸溶液；在纯碱生产中生成的污垢，可用5%的盐酸溶液，但不得使用对板片和垫片产生腐蚀的化学清洗剂。

⚠ 注意：不得使用盐酸清洗不锈钢板片。制备清洗液时，水中氯离子含量不得超过300PPM。

2、拆开清洗

- 在板式热交换器热状况时不要打开设备。
- 板片拆下后用清水冲洗，特别是板片和密封垫片的下部清洗后易积聚灰尘，必须仔细清洗。
- 如果板片上结垢或有机物较厚，应将板片从框架取出，拆下密封垫片后将板片置于清洗液中清洗。将板片清洗干净后用清水冲洗并干燥，重新装上密封垫片。垫片要保持干净，保证没有粘颗粒物。
- 重新装配时，应按随机配带的流程图进行组装，按拆开的逆过程进行，并检查板片排列是否正确。夹紧尺寸见“产品合格证”相关数据。

3、清洗板片注意事项：

- 更换密封垫片或板片时，将板片旋转一定角度拆下。切勿强行拆装，以免损坏板片。
- 采用机械清洗法时，严禁采用钢丝、铜丝等金属刷子刷洗板片，以免损坏板片和密封垫片，应采用毛刷或纤维刷小心谨慎地进行。

⚠ 特别提醒：如对清洗过程不能准确掌握时，请与THT联系，由THT提供清洗方案。清洗液的选用应考虑到其它元件的耐腐蚀性能。

4、更换密封垫片或板片应按以下顺序进行：

- 拆卸废旧垫片时，不得使垫片槽内有划痕。
- 用丙酮、丁酮或其它酮类溶剂，清除垫片槽内的残胶。
- 用干净的布或棉纱擦净垫片槽和垫片。
- 将粘接剂均匀的涂在垫片槽内，将干净的新垫片贴上。
- 贴好垫片的板片要放在平坦、阴凉、通风的地方自然干固4小时后才可安装使用。

Cleaning

The cleaning of plate heat exchanger can be divided into two ways, one is line cleaning, the other is disassemble cleaning

1. CIP–line cleaning

Chemical cleaning should reverse backwash, cleaning liquid flow rate is the 1.5 times of the normal flow rate of the media. After cleaning, to use water to replace cleaning fluid, until cleaning fluid is completely discharged so far. For relatively hard and thick layer of dirt ,the dirt floor can be softened with chemical cleaning, and then clean the surface.

The different dirt should be dealt with different chemical cleaning fluid .In addition to soda ash solution by dilution, the scale can be used for a 5% nitric acid solution and 5% hydrochloric acid solution is available for the dirt in the production of soda ash, but not to use chemical cleaning which corrupts the plates and pads.

⚠ Note: Under no circumstances shall not use hydrochloric acid clean stainless steel plate. When preparing cleaning fluid, chloride ion content is no more than 300PPM.

2. Open the cleaning

- When thermal state is in the plate heat exchanger, do not open the device.
- Remove the plate, then washing with water, and in particular, after cleaning , the lower part of the sealing gasket plate which easily accumulates dust must be carefully cleaned.
- If the scaling is on the plate or thick organic matter is on the plate ,the plate should be removed from the frame and remove the gasket plate, then place it in the cleaning solution . The washed plate should be washed with water and dried, and replace the gasket. The gaskets should keep clean to ensure that no sticky particles.
- Re–assembly shall be equipped with a flow chart to rig out and according to the inverse process of open and check whether the plate arrangement is correct. About clamping dimensions should follow the reference data of manufacturer certificate.

3. Cleaning plates Note:

- When replacing gasket or board e, should rotate the angle and remove the plate Do not forcefully remove so as not to damage the plate.
- By mechanical cleaning method, prohibiting the use of steel, copper and other metal scrub from brushing plate, so as to avoid damage to plates and sealing gaskets, brush or fiber brush should be used carefully.

⚠ Special note: If the cleaning process can not be accurately mastered, please contact with THT and THT provides cleaning program. The choice of cleaning solution should take into account other components of the resistance to corrosion.

4. Replacement gasket or plate according to the following order:

- Disassembling waste pads, it may not have scratches in the gasket tank.
- Using acetone, methyl ethyl ketone, or other ketone solvents to remove the residual glue from gasket tank.
- Using a clean cloth or cotton pad to wipe the gasket groove.
- Adhesive will be evenly coated in the gasket tank, and then paste the clean and new gasket.
- The sticking gasket plate should be put on a flat, cool, well ventilated place to dry naturally for 4 hours before installation

包装和运输

- 板式热交换器出厂时，均备有装箱清单、合格证、使用说明书、板片组装流程图。根据用户要求可配带一定数量的密封垫片和专用扳手，订货时需另加说明。
- 运输时宜直立运输。
- 标牌标明的内容：产品名称、型号和设计压力、设计温度、换热面积、质量以及制造厂名称、出厂编号、日期，密封垫片标记。

储 存

1、板式热交换器的储存要求

- 板式热交换器适合在室内存放，室内温度在15℃-20℃，最大湿度为70%。
- 室内不能有产生臭氧的设备，如电极、焊接设备等，臭氧会对许多橡胶有破坏作用（龟裂）。
- 室内不能存放有机溶剂和酸溶液，应避免热辐射和紫外线辐射。
- 排空设备内的介质。
- 设备如果存放一段时间(6个月或以上)，应采取将板束夹紧尺寸放松至1.1L，使用时再夹紧到L。
- 夹紧螺栓表面应涂刷较好的防锈液。

2、垫片储存

- 如有配带的密封垫片时，应在室内存放，储存房间必须保持凉爽、干燥、通风、无灰尘，避免阳光直射。
- 垫片储存的环境温度应不超过40℃，相对湿度不大于80%；橡胶垫片至少应距离热源1m以上。当橡胶垫片在低温下运输或存储会变硬，需在温度约20℃的环境下解冻一定时间。
- 垫片储存室内照明最好用普通的白炽灯，应不使用任何产生臭氧的装置，如荧光灯、水银蒸汽灯、高压电器、电动机或其他可以产生电火花的或无声放电的装置。应隔绝可能通过光化学作用产生臭氧的可燃气体或有机蒸汽。
- 存放橡胶垫片时应避免重压，不应被拉伸、压缩或使其产生其他形式的形变。禁止用细绳、铁丝等将橡胶垫穿栓悬挂。
- 垫片储存期间不应与酸、碱、油类及有机溶剂接触；不应与某些金属，特别是铜和锰接触。
- 应避免不同种类的橡胶垫片混杂存放。
- 垫片储存应注意防止某些动物，特别是啮齿类动物如老鼠对橡胶垫片的危害和污染。应防止某些虫类或霉菌在橡胶垫片上生长。

Packaging and transport

- When the plate heat exchangers are out of factory, they are equipped with packing list, certificate, manual, assembly sheet flow chart. According to user’ s requirements ,they can be equipped with a number of sealing gaskets and special wrench, plus description when ordering.
- When transport ,should take vertical transportation.
- The sign indicates the contents which include: product name, model and design pressure and design temperature, heat transfer area, quality, and the name of manufacturer, serial number, date, sealing gasket mark.

Store

- The requirements of plate heat exchanger storage
 - Plate heat exchanger is suitable for indoor storage, indoor temperature is 15 ℃ –20 ℃, the maximum humidity of 70%.
 - Indoor ozone can not have the equipment, such as electrodes, welding equipment, ozone which will have damaging effects on many rubber (cracking).
 - Organic solvents and acids can not be stored indoor in order to avoid heat radiation and UV radiation.
 - Emptying the media within the device.
 - Eequipment, if stored for some time (6 months or more), should relax the plate beam clamp size to 1.1L, and then use clamping to L.
 - The surface of clamping bolt should be brushed the better solution of the rust.
- Gasket store
 - If equipped with a sealing gasket , it should be kept in the room, storage room must be kept cool, dry, ventilated, no dust and avoided direct sunlight.
 - Gasket storage temperature should not exceed 40 ℃, relative humidity less than 80%; rubber gasket should be at least more than 1m away from heat sources. When the rubber gasket in the low temperature transportation or storage may harden, should thaw some time in the temperature about 20 ℃ environment.
 - Gasket storage room is better to use ordinary incandescent lighting, any device which produces ozone should not used, such as fluorescent lamps, mercury vapor lamps, high voltage electrical appliances, motor or other devices which can produce sparks or silent discharge. Through the photochemical reaction, combustible gas or organic vapor which produce the ozone should be isolated.
 - Rubber gasket should be placed to avoid pressure, should not be stretched, compressed, or to produce other forms of deformation. Prohibiting the use of string, wire, etc and wearing rubber plug hanging.
 - Gasket during storage should not be exposed to acid, alkali, oils and organic solvent exposure; not with certain metals, particularly copper and manganese exposure.
 - Should avoid mixing different types of rubber pads for storage. Pad storage should protect against the hazards and pollution of certain animals, especially rodents such as mice on the rubber gasket. Should prevent certain insects or fungus from growing on the rubber gasket.