HISAKA – Delivering the latest plate technology to the world

Heat Exchanger Division
HISAKA WORKS, LTD.
The Heat Exchanger Division of HISAKA WORKS, LTD. has acquired the ISO9001 certification for its quality management system under which all products, starting with plate heat exchangers, are subject to.

HISAKA WORKS, LTD. has acquired the ISO14001 certification for its environmental management system.
Alumite Processes

Aluminium is a soft metal that is very prone to scratches and environmental damage. Hence, processing aluminium and its alloy parts increases its strength and durability against corrosion and weather damage. Processed aluminium is known as Alumite; a technology developed in Japan by forming an aluminium oxide film on the aluminium (or its alloy) surface. The oxygen produced at the anode (positive pole) will produce a porous layer with great electrical isolation characteristics to improve on:

a. Corrosion resistance
b. Water resistance
c. Heat absorbance
d. Optical reflection
e. Coloration properties

Therefore, alumite is suitable to be used in various contemporary industries such as:

* Construction materials
* Automotive components
* Optical device components
* Solar heat absorbent panels
* Printed Wiring Boards
* Electrolytic condensers
* Reflector panels
* Magnetic storage disks

HISAKA plate heat exchanger (PHE) is ideal for alumite processing because of its high performing and high alteration flexibility to correspond to specific processes, especially when highly corrosive solutions such as sulfuric acids and oxalic acids are involved. Furthermore, the usage of HISAKA PHE is vast in the alumite production process, of which including:

i) Heating of degreasing solutions
ii) Heating of etching solutions
iii) Heating of sulfuric acid solutions
iv) Cooling of alumite solutions

Overview of HISAKA WORKS Konoike Plant

HISAKA WORKS is a comprehensive and integrated manufacturer of plate heat exchangers having the most advanced production facilities.
# HISAKA Plate Heat Exchanger

## Structure of a Plate Heat Exchanger (PHE)

**Plate heat exchangers (PHE) plates:**
- Pressed thin metal plates that have convex and concave wave patterns (herringbone patterns)
- Made of corrosion resistant materials, such as stainless steel or titanium
- Perimeter of the plates is sealed with synthetic rubber gaskets (silt-in or glue on method)
- Suspended perfectly on both upper and lower guide bars
- Fastened and compressed by a fixed and moving frame

**Mechanisms:**
- Counter current flow of high temperature fluid and low temperature fluid flowing against each plates. This phenomenon ensures heat transfer to take place.
- Gaskets ensure that the flowing fluids do not intermix.

## Advantages of Plate Heat Exchangers (PHE)

1. **High Performance**
   - Pressed - moulded herringbone patterns enhance heat conduction performance (heat transfer coefficient), hence able to reduce heat conduction surface area.

2. **Lightweight and Compact**
   - Compressed thin heat transferring plates
   - Limited fluid capacity
   - Smaller heat transferring surface area
   - This realizes reduction in installation space, making installation and maintenance easier

3. **Quick Start - Up**
   - Limited fluid capacity per unit allows quick operation start up, and also possible to correspond to changes in operating conditions with high precision.

4. **Excellent Maintainability**
   - Assembly and disassembly are made convenient by simply removing the fastening bolts
   - Maintenance are thereby made easy, even for visual inspections and cleaning

5. **Easy Modification of Capabilities**
   - Flexibility in modifying the heat transferring surface area by simply increasing or decreasing the number of plates

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**Flow Path Configuration**

The fluid flows alternately through the flow path created between each plate and forms a countercurrent of the high temperature fluid and the low temperature fluid between every other plate to perform the heat exchange.
**ALUMITE PROCESSES**

- **Plate heat exchangers for alumite process**
  HISAKA Plate Heat Exchangers (PHE) are made out of materials which are high in corrosion resistance, which is especially important when electrolyzing and oxidizing aluminium with anodes are involved.
  HISAKA PHE are used for controlling the tanks fluids temperature in the alumite process summarized below:

### Standard Alumite Processes

<table>
<thead>
<tr>
<th>Process</th>
<th>De-greasing of Material</th>
<th>Etching</th>
<th>De-smulintg</th>
<th>Alumite Treatment</th>
<th>Electrolytic Coloring</th>
<th>Sealing Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Heating of the aqueous alkali solution (de-greasing solution) to remove dirt from the aluminum material</td>
<td>Heating of the etching solution used in the process of dissolving the alumimum material with an acid. This is also to create surface texture to the aluminum</td>
<td>Heating of the sulfuric acid solution used to remove the impurities on the aluminum surface</td>
<td>Cool down alumite treatment solutions</td>
<td>Dye immersion to add in color by allowing the dye to soak into the fine holes of the aluminum</td>
<td>The oxidized film is then boiled in high temperature pressurized steam (or in boiling water) to seal up the fine hole on the film in order to improve corrosion resistance, weather resistance and staining resistance.</td>
</tr>
</tbody>
</table>

### About SUS315J1

In cases when there are concerns about the corrosiveness of alumite solutions in the alumite process, the use of SUS315J1 is increasing for the plate material in consideration or corrosion resistance.

#### Chemical Components of SUS315J1

<table>
<thead>
<tr>
<th>Components</th>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>0.08</td>
<td>0.30</td>
<td>2.00</td>
<td>0.05</td>
<td>0.03</td>
</tr>
</tbody>
</table>

#### Sulfuric Acid Resistance of Stainless Steel (Reference)

![Graph]

**Example of Application**

- Degreasing Tank
- Alumite Tank
- Electrolytic Coloring Tank
- Electrodeposition Tank
- Rinsing Tank

*) A commonly used material. The material will differ depending on operating requirements.