

Plastic Process Cooling Chiller

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Cooling during plastic processing is necessary because a large amount of heat must be removed from the material, mold or machine, such as plastic injection, plastic extrusion (sheet extrusion or profile extrusion), bottle blowing and film blowing, etc.

Thermoplastic materials such as polypropylene, nylon and PET must be heated to their melting temperature before shaping. After melting, they can be manipulated (injection molding, extrusion, etc.) into new shapes. Finally, they must solidify by cooling.

1.What Is a Plastic Process Cooling Chiller?

Most plastic processes require some form of cooling. Whether using injection molding, extruded plastic, blow molding, rotational molding, or thermoforming, all of these processes require cooling.

The cleanest and most recommended cooling method is to use plastic process chillers. Plastic chillers are cooling devices that cool plastics throughout the manufacturing process.This is a closed loop system so debris from the environment does not mix with your process water.

Plastic process cooling chillers work by circulating coolant through the cold side of the process water system, removing excess heat from the mold and transferring the heat to the surrounding environment.

When it comes to cooling your plastic process, quality and reliability should be your top

considerations when choosing the right plastic chiller.



Plastic Process Cooling Chiller

2.What Does a Plastic Chiller Do?

A plastic chiller is a refrigeration device designed specifically for cooling plastic processes , such as injection molding, plastic extrusion, blow molding, and thermoforming. Its primary function is to maintain precise and controlled temperatures in various components of the plastic processing equipment.

Injection molding: The most common method of producing plastics. For injection molding, cooling accounts for 80% to 95% of each Plastic Processcycle. Cooling is critical as it maintains quality on the production line and ensures parts are manufactured to target dimensions.

Plastic extrusion: Heated plastic is forced through various shapes to form a specific shape. Keeping molten plastic at the right temperature is key to full flow, form filling and rapid solidification.

Blow molding: Plastic is melted and formed into a rod or tube shape, which is clamped into a mold and then filled with compressed air. This process causes the plastic to expand into its final shape. It is crucial to remove heat at a monitored rate during this process, as cooling the mold too quickly or too slowly can cause distortion.



Plastic Industry

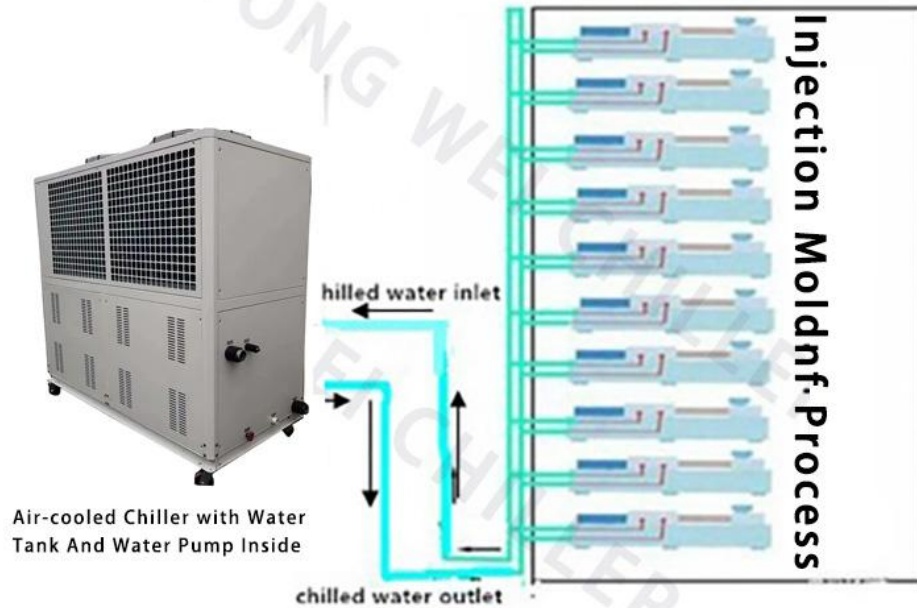
3.What's the Difference Between Air-cooled & Water-cooled

Plastic Process Chillers?

There are two types of Injection Molding chiller: one is **air-cooled Plastic Process chiller**, the other is **water-cooled plastic process chiller**;

Air-cooled plastic process chillers use ambient air to dissipate heat from the brewing processes. They are energy-efficient, space-saving, and less maintenance that helps save money.

Water-cooled plastic process chillers use water from an external water cooling tower to dissipate heat from the brewing processes. These systems are longer lifespan, Relatively quiet, and more consistent cooling performance than the air-cooled Plastic Process chiller.



Air-Cooled Plastic Process Chiller installation

Water-Cooled Plastic Process Chiller installation

Should you choose an air-cooled or water-cooled Plastic Process chiller? [Contact Us](#) for help determining the best solution for you.

4.What Are the Differences Between Plastic Process Scroll Chiller and Plastic Process Screw Chiller?

Plastic Process Scroll Chiller

- 1/2 HP-60HP
- Danfoss/Panasonic Scroll Compressor
- Built with water tank and water pump

Plastic Process Screw Chiller

- Above 60HP
- Hanbell/Bitzer Screw compressor
- Without water tank and water pump



Air-cooled Plastic Process Scroll Chiller



Air-cooled Plastic Process Screw Chiller



Water-cooled Plastic Process Scroll Chiller



Water-cooled Plastic Process Screw Chiller

5.What Are The Main Components of Plastic Process Chillers?

5.1 Compressor

The compressor is the key mover in water chiller because it produces pressure variations to stir the refrigerant around.

From 1/2HP(1/2 Ton) to 60HP(50Ton) Plastic Processchiller , which is with **Panasonic** or **Danfoss brand Scroll compressor** ,

Above 60HP Plastic Processchiller,which is with **Hanbell** or **Bitzer screw compressor**;



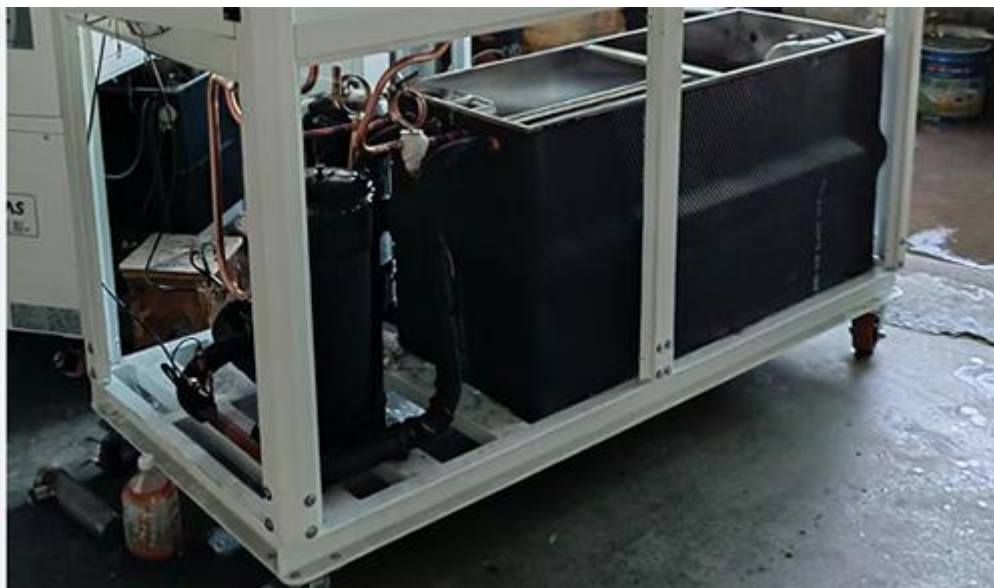
Panasonic Compressor

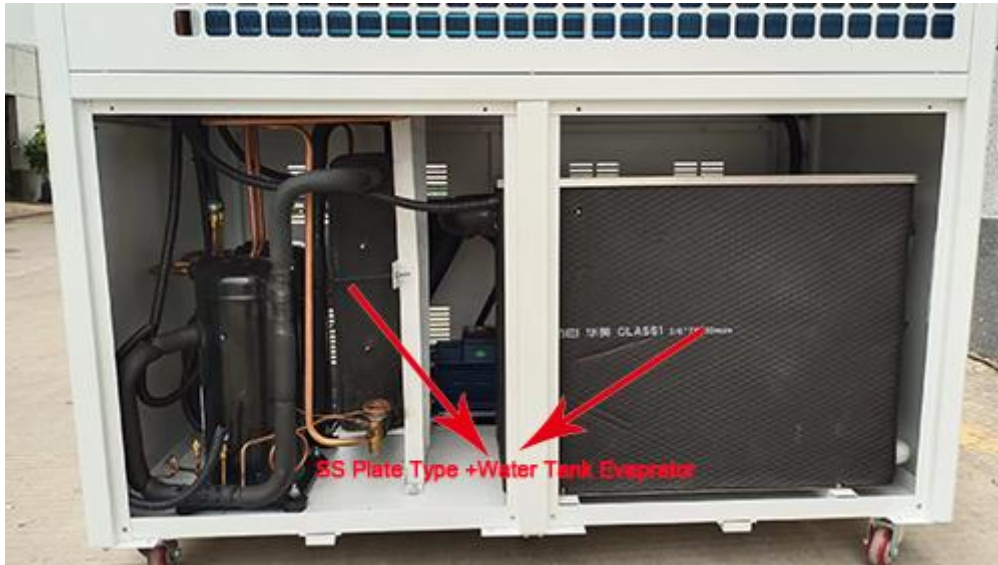


Danfoss Compressor

5.2 Evaporator

The evaporator is a crucial component of air-cooled water chiller, as it is responsible for extracting heat from the liquid being cooled, it is located between the compressor and the expansion valve. There are three types of evaporators : **coil in water tank evaporator , shell and tube evaporator, 304SS stainless steel plate type evaporator.**





SS Plate Type+ Water Tank Evaporator

5.3 Water Pump

The water pump is designed to increase the pressure and the flow of the chilled water in a closed space.



5.4 Condenser

The condenser for air-cooled Plastic Process cooler is equipped with efficient cross-seam fins and female threaded copper tubes for high heat exchange efficiency and good stability. Its function is to cool down the refrigerant steam released from the compressor into a liquid or gas-liquid mixture.



Aluminum fin+fan Condenser for air -cooled Plastic Processchiller

The condenser for water-cooled Plastic Process cooler is shell and tube ,with the internal copper tubes employing an outer thread embossing process. This design effectively enhances the heat exchange efficiency between the refrigerant and water during the process. Compared to traditional smooth copper tubes, the outer thread embossing process increases the surface area of the copper tubes, thereby expanding the contact area for heat exchange and improving the thermal conductivity of the condenser. This optimization design allows the condenser of the water-cooled chiller to transfer heat from the refrigerant to the water more rapidly and consistently, enabling the water to carry away the heat.



Shell and tube Condenser for water-cooled Plastic Processchiller

5.5 Controller Panel



Controller Panel

6. What are the Key Features of A Plastic Process Chiller?

- Energy-efficient Panasonic/Danfoss/Hanbell/Bitzer compressor
- Chilled Outlet water temperature control 7°C to 25°C
- Precise temperature controller
- Environment-friendly refrigerant R407c/r410a
- PID temperature controller
- Easy installation ,operation and low cost of maintenance
- 304 Stainless Steel Coil in SS water tank /Shell And tube as evaporator

7.How to Choose Right Plastic ProcessChiller for Your Plastic Process Process?



How to calculate right cooling capacity for your Plastic Process chillers?

Choosing the right size of an Plastic Processchiller is crucial for ensuring optimal performance and efficiency in your Plastic Processprocess. How to calculate the correct cooling capacity for your Plastic Processchiller,pls see below:

A: Simple formula

Every 90 Ton clamping force of Plastic Processmachine requires 1HP cooling capacity(2.5-3kw)

180T × 2 units

300T× 4 units

1000T × 3 units

The required chiller size is $(180 \times 2 + 300 \times 4 + 1000 \times 3) / 90 = 50.66$, that is, 50HP chiller is needed. When used for the cooling of other equipment, depending on the specific flow of the cooling water cycle and outlet water temperature to determine.

B: The advanced formula

$$q = w \times c \times \Delta t \times s$$

- q is the required cooling capacity in kcal/h.
- w is the weight of the plastic material in kg/h.
- c is the specific heat capacity of the plastic material kcal/kg°C.
- Δt is the temperature difference between the melt material temperature and the temperature at which the product is released from the mold in °C
- s is a safety factor (generally take 1.35-2.0), when a single injection machine matching, we can choose a small value, and when a chiller matches with multiple molds, we can choose a large value.

For example: a pair of molds to produce PP products, the hourly production capacity is 400kg, what cooling capacity is needed?

$$q = 400 \times 0.48 \times 200 \times 1.35 = 51840 \text{ (kcal/h)}$$

Every hour the molds need 51840kcal/h=60KW cooling capacity, we can choose a chiller with cooling capacity bigger than 51840kcal/h.

In the actual selection of chillers, it is difficult to obtain complete data. According to our many years of experience, $\Delta t = 200 \text{ }^\circ\text{C}$, it is an average value of many common plastic products.

If the mold has hot rubber channel, hot rubber channel energy should also be considered in the calculation of cooling capacity.

The unit of hot rubber channel heat is usually kw, so the calculation should be converted into kcal / h. (1kw = 860kcal / h)

(Air-cooled chillers are most used for Plastic Processmachine, learn the difference between air-cooled and water-cooled chiller.)

Annexed Table of Common Material Properties

Material Injection temperature°C Mold temperature°C Specific heat capacity Kcal/kg°C

PE	160~310	0~70	0.55
ESP	185~250	0~60	0.35
Nylon	230~300	25~70	0.58
PC	280~320	70~130	0.03
PP	200~280	0~80	0.48
ABS	180~260	40~80	0.4

Types of Injection Moldingchiller system?

There are two types of chiller :**Air Cooled Plastic Process Chiller** and **Water Cooled plastic process Chiller**.

Water cooled chiller needs a separated water cooling tower and water cooling pump ,if you don't have exsiting water cooling tower,we suggest you use air cooled chiller; But if your ambiemt temperature is very high above 55°C ,we suggest you use water cooled chiller , as it is easier to dissipate heat for water cooled chiller with water cooling tower.

But Most customers use air cooled Injection Moldingchiller ,which is more easily install and save space.

Whether chillers need built-in Tank or not?

In a chiller system, a tank is usually equipped to buffer the thermal load of the chiller.

But should we choose a built-in type of tank or an external type of tank?

A chiller with a built-in tank is easier to install and can be used simply by connecting a water pipe to your application.

But it has a limited capacity and is not suitable for applications with larger chilled water demands.External tank's capacity can be customized according to specific needs.

It can buffer a larger heat load, store more chilled water, but the installation will be more troublesome.



Guangdong Tongwei Machinery Co.,Ltd. www.refrigerationchillers.com

If you don't have external water tank ,we suggest our chiller built-with water tank ,which is easy for you to install.

Cooling capacity unit conversion?

1 KW=860 kcal/h ;

1 TON=3.517 KW;

1 KW=3412 Btu/h;

8.Get a Quote on Industrial Plastic Process Chillers Now

As a leading *industrial chiller manufacturer*,we engineer and produce high-quality process chillers compatible with a broad range of industrial processes.

Depending on your needs, we also offer *custom chillers* to ensure that each client receives the industrial chiller best suited to their unique process.

Request a quote now on our industrial plastic process chillers or learn about the other *air-cooled chillers* and *water-cooled chillers*.