

HEPACO (Air processing & Heat Recovery Sys.)

AIR COOLED SCROLL CHILLER

TECHNICAL CATALOGUE



Air cooled scroll chiller utilize mechanical refrigeration cycle to produce chilled water or chilled water and antifreeze mixture. They reject the building heat to the ambient with an air cooled condensing coil. Air cooled chiller typically have a lower instant and maintenance cost than water cooled system. It does not require a cooling towers condenser water pump and piping also need smaller mechanical room and associated condenser water chemical treatment system. Hepaco air cooled scroll chiller are reliable for outdoor installation with the overall protection class of IP54, all chillers are designed and manufactured for small to medium sized application that widely use in Residential, Medical, shopping mall and industrial projects . Chillers designed in both single and dual circuits according to the cooling capacity and the regional ambient condition. Each unit includes hermetic scroll compressor(s)with outstanding durability ,a liquid evaporator (shell & tube or plates),centrifugal propeller condenser fan(s) and user-friendly controller (PLC) Mounted in an electrical panel. Condenser made with Aluminum plate fins that are mechanically bonded on seamless copper tubes in a staggered configuration for maximum heat transfer efficiency For the tropical weather air cooled chillers are modified to prevent aluminum corrosion .

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

HEPACO Air Cooled Scroll Compressor Chillers

1-General features

- V to 120 tons (-----kw tokw) Real capacity at 12 to 7° c in evaporator and standard 35°C entering dry air temperature, with 50°C condensing temperature for condenser.(for more ambient as well as tropical condition we recommend correction factor table or we)
- High efficiency evaporator is designed for single or double identical refrigeration circuits (shell& tube or brazed plate heat exchanger) insulated with the Elastomeric rubber foam engineered for the optimum performance.
- All HEPACO scroll chillers produce with Original Copeland or danfoss compressor and charged with R22, R407C or R134a at the factory (based on customer's demand)
- Condenser designed and built with finest seamless copper tube mechanically expanded in hydrophilic/hydrophobic aluminum fins.(Black-Blue/Gold)in V or W shape Refrigeration cycle display unit shows the operational functions and faults in each cycle.
- Chillers Designed for quiet operation thanks to its Low noise Axial fan(s) with three or single phase motor and protection class of IP55 as well as piping specifically designed for minimum acceptable vibration
- All chillers manufactured in accordance with HEPACO quality Management system to meet applicable requirements of ANSI and ARI standards.
- Digital chilled water temperature controller provides maximum accurate water temperature.
- Electrical and control panels are factory wired and tested completely

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

2-Equipment List

- **GENERAL**

- Digital multistep / PLC or PCBcontroller
- Insulated evaporator
- Suction line insulation
- Installed and wired
- Water drain plug (Evaporator)
- Compressor silencer box (optional)
- Silencer, Sound Attenuator (optional)

- **REFRIGERANT CIRCUIT**

- Charging valve
- Filter driers
- Sight glass, moisture indicator
- Operating charge
- Service valve
- pressure relieve valve

- **SAFETY CONTROLS**

- Crankcase heater
- Low pressure switch
- High pressure switch (manual reset)
- Phase control
- Freeze protection thermostat
- Evaporator flow switch
- pressure relieve valve

- **INSTRUMENT PANEL**

- Refrigeration cycle display unit
- Indicators :
- high-pressure, overload, compressor capacity, crankcase heaters, flow switches, solenoid valves
- Discharge pressure gages
 - Suction pressure gages
 - Evaporator leaving water temp

- **OPERATION CONTROLS**

- Liquid line solenoid valves
- Thermal (or electrical)expansion valves
- Non-recycle pump down type
- Manual Off - Reset - Run switch

HEPACO (Air processing & Heat Recovery Sys.)

Compressor



Hepaco air cooled chillers use the high technology of Copeland or danfoss hermetic scroll compressors which is familiar for refrigeration & HVAC industries throughout the world, due to its quality and efficiency and life time.



HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

Evaporator

TECHNICAL INFORMATION

The main applications of our dry-expansion exchangers are: water, liquid or brine solutions cooling in refrigeration plants and hot water production in heat pumps. **Suitable refrigerants are: HCFCs, HFCs, and others, unless they are compatible with material construction.**

Hepaco shell & tube compact exchanger's series have cooling capacity range, at specified standard conditions, from about **18 up to 1400 kW with 1 to 4 refrigerant circuits**. The water connections standard position is horizontal, but on request can be placed vertically, (Besides the exchangers can be ordered with removable tube bundle when not supplied as standard feature).



HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)



MATERIALS

The quality of the materials used to manufacture hepaco exchangers satisfy the requirements of the TEMA & ASME Codes. The standard type construction of the shell & tube exchangers consists of following materials: carbon steel for headers, tube sheets, shell, refrigerant and water connections, copper for exchanger tubes, poly ethylene or carbon steel for the baffles, asbestos free for gaskets, bolts made of alloys steel. On request, other materials compatible with our production facilities can be used. Please contact our Technical Staff for nonstandard materials and cooling capacity.

TESTS, VESSEL CODES, WORKING LIMITS

Each exchanger undergoes to a pressure test on the refrigerant side (also differential test when more than single circuit) and water side according to the standard procedures. Being the shell & tube exchangers pressure vessel, the safety requirements are assured by strictly following the main ASME Code during the design, choice and use of suitable materials, manufacturing and controls, pressure test and final documentation. Temperature and pressure working limits are shown in the table below.

Maximum Design Working Pressure	- Tube side (refrigerant): 200 psig - Shell side (water): 450 psig
Shell	Carbon Steel
Tubes	16 mm (5/8") OD heavy gauge 1 mm wall thickness; dioxidized copper fitted with especially designed inserted aluminum turbulators to increase the turbulence of the refrigerant and consequently the heat transfer coefficient
Baffles	The poly-ethylene baffles are designed to suit the heat exchange and to give bundle structure an adequate mechanical strength.

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

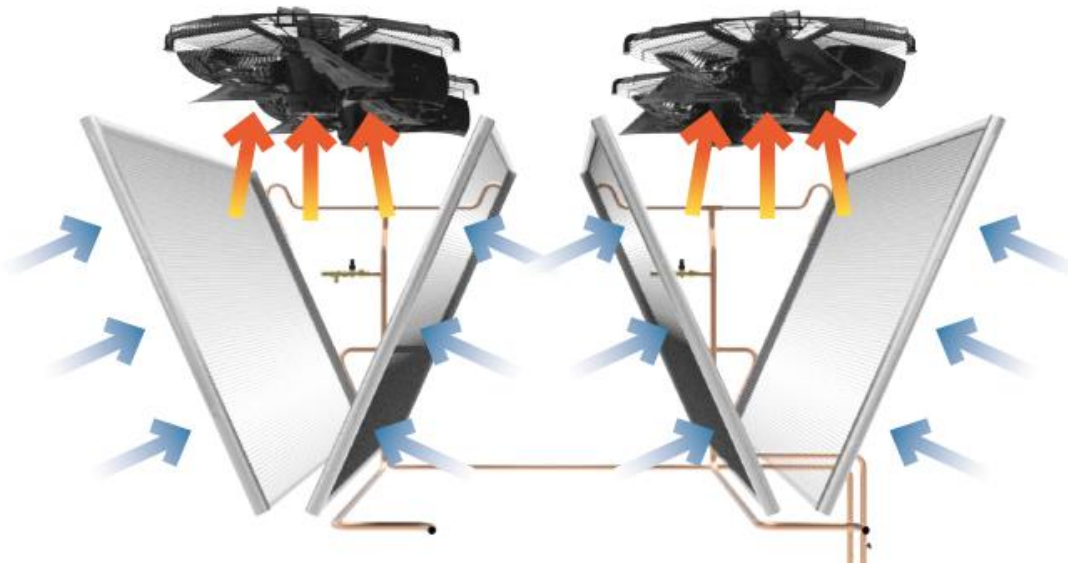
Insulation	Completely insulated with proper insulation to prevent heat gain or sweating.
Water Connection	Water inlet and outlet weld-neck standard flanges, water drainage and air vent, sockets and antifreeze and thermostat probes.
Tube Sheet	Carbon steel alloy ST-52, especially finished, the tube bundle is fixed to tube sheets by means of mechanical rolling expansion and special chemical glue for long time heavy duty operation.

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

Condenser Coils



Aluminum plate fins are mechanically bonded on seamless 3/8-inch OD copper tubes in a staggered configuration for maximum heat transfer efficiency. Copper plate fins are another coil option which is proper for moderate coastal ambient condition. This will improve cooling capacity of the units too. Condenser coils are factory leak tested at 470 psig (33.0 Kg/cm²) air pressure underwater and vacuum dehydrated. Over 10°F of liquid sub cooling may be obtained, depending upon the difference between condensing temperature and the outside ambient temperature. Sub cooling adds to the efficiency of the system and assures liquid refrigerant at the expansion valve even though vertical lifts or long runs of piping may be necessary.

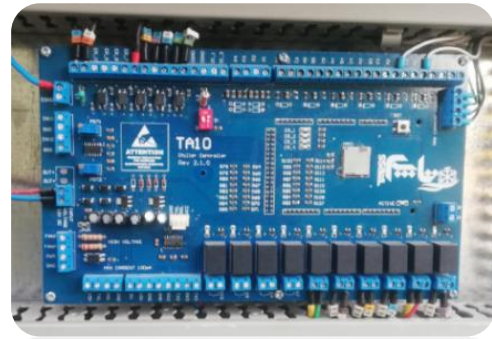
2- Copper fin condenser coil- the unit constructed with condenser coil which have copper fins (This is not recommended for units in areas where they may be exposed to acid rain). Post-Coated condenser coil- The unit is built with air-dry Aluminum Impregnated Polyurethane – coated condenser coils. This is another choice for seashore and other corrosive applications. The coating material (FIN GUARD) is a green VOC FREE (ECO) with high corrosion resistance level.

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

Power and control system



All Hepaco Chillers are equipped with friendly designed fault detection and display boards for each circuit. The display unit provides monitoring the operation and fault of components. All HEPTA chillers have two separated refrigeration cycles for easy troubleshooting and error detection. The controller system can be PLC or micro controller and has the ability to connect to BMS systems. It automatically controls the regulation of water temperature, the compressor timing and the alarms.



HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

Options and Accessories

Unit Options

1- Hot gas by-pass- permits continuous, stable operation at capacities below the minimum step of compressor unloading to as low as 25% capacity (depending on both the unit and operating conditions) by introducing an artificial load. Hot gas by-pass is installed on only refrigerant system on two circuited units.

3- Blue Fin Condenser Coils –The air cooled condenser coils are constructed of blue epoxy-coated aluminum fins. This can provide corrosion resistance comparable to copper fin coils in typical seashore location. Either these or the phenolic-coated coils (above) are recommended for units being installed at the seashore or where salt spray may hit the unit.

4- Sound Attenuation- one or both of the following sound attenuation options are recommended for residential or other similar sound sensitive location: Compressor Acoustic sound Blanket- each compressor is individually enclosed by an acoustic sound blanket. The sound blankets are made with one layer of acoustical absorbent textile fiber of 9.5 mm (3/8”) thickness.

5-Low Sound Fans-Lower RPM, 8-pole fan motors are used with steeper-pitch fans. (Factory-mounted) Vibration Isolator-Level adjusting, spring type or seismic deflection or neoprene pad isolator for mounting under unit base rails.(Field Mounted)

6- Oil Separators Kit- for installation of large piping erection, HEPTA recommended to use oil separator. This will ensure minor oil amount immigration from compressor during unit operation.

Selection procedure

Effect of Altitude on Capacity

Air cooled chillers capacities given in the performance data tables on pages ### to ### are at sea level. At elevations substantially above sea level, the decreased air density will decrease condenser capacity and, therefore, unit capacity and efficiency. The adjustment factors in table ### can be applied directly to the catalog performance data to determine the unit’s adjusted performance.

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

Altitude	Capacity	Power
Sea Level	1.000	1.000
2000 ft (610 m)	0.984	1.012
4000 ft (1220 m)	0.965	1.023
6000 ft (1830 m)	0.946	1.034

Ambient Considerations

Start-up and operation at lower ambient requires sufficient head pressure be maintained for proper expansion valve operation. At higher ambient, excessive head pressure may result. Standard operating conditions are 50°F to 125°F. With a low ambient fan speed control, operation down to 0°F is possible. Minimum ambient temperatures are based on still conditions (winds not exceeding five mph). Greater wind velocities will result in increased minimum operating ambient. Unit with hot gas bypass have a minimum operating ambient temperature of 10°F. For proper operation outside these recommendations, contact HEPTA sales office.

Chilled Water Quantity and Range

Chilled water quantity is determined by the refrigeration capacity and chilled water temperature range according to the following equation:

$$\text{Chilled Water (gpm)} = \frac{\text{Capacity (ton)} \times 24}{\text{Chilled Water Range (°F)}}$$

A system shall be designed for constant water flow through the evaporator.

Fouling Factors

The tabulated ratings in this catalogue permit a fouling factor of 0.0005 and 0.0001 respectively in English and metric measures, for the evaporators. The chilled water circuit is closed and there is no need to increase the fouling factor for the evaporator. However if a fouling factor of 0.001 in English measures or 0.0002 in metric measures is required, multiply the tabulated capacities and power consumptions respectively by 0.97 and 1.03.

Low Temperature Operation

HEPACO

Tel: +9821-88825400 Fax: +9821-88839925

HEPACO (Air processing & Heat Recovery Sys.)

To avoid damage to the evaporator, when working at low temperatures, it is suggested to use glycol mixtures, the freezing points of which are shown. When working temperature approaches the reported freezing points, brine concentration should be increased.

Freezing point (F)	Ethylene glycol by weight (%)
23	12
14	22
5	30
-4	36
-13	40
-22	44
-31	48
-40	52

HEPACO (Air processing & Heat Recovery Sys.)

