



Air Cooled Heat Exchangers and Condensers

Innovation through engineering

Working towards a sustainable future

NSCT Heat Exchangers[®]



About Us

We are a leading cooling tower company with a vast experience in the design, manufacturing and installation of large capacity heat transfer equipments. We are located in the National Capital Region (NCR) of India with modern design, manufacturing and testing facilities. Our dedicated workforce has a strong work ethic to supply our customers with the best cooling solutions as per the local prevalent conditions. We extensively focus on developing the latest technology through continuous investment on R&D. This has been a key factor for the success of our innovative products including carbon fiber drive shafts, composite rollers and air cooled heat exchangers and condensers.

Experience

Today we are a company that manufactures both evaporative and dry cooling towers. Depending on the site conditions, our experienced engineers can give a feasibility analysis on the basis of performance, capital and running costs to better facilitate decision making on the choice of the required cooling system.

Quality Management

We understand how vital our product performance is for your industrial process outputs and so we ensure zero product downtime. For this, we enforce a thorough ISO 9001 quality management system for the design, manufacture, installation and commissioning of air cooled heat exchangers.

Environmental Sustainability

As a company we believe that environmental sustainability should be the guiding force in all industrial sectors. As a design and manufacturing company we not only believe in manufacturing products to cater to a wide range of customers but also design our products which last for long service periods with low operational power requirements.

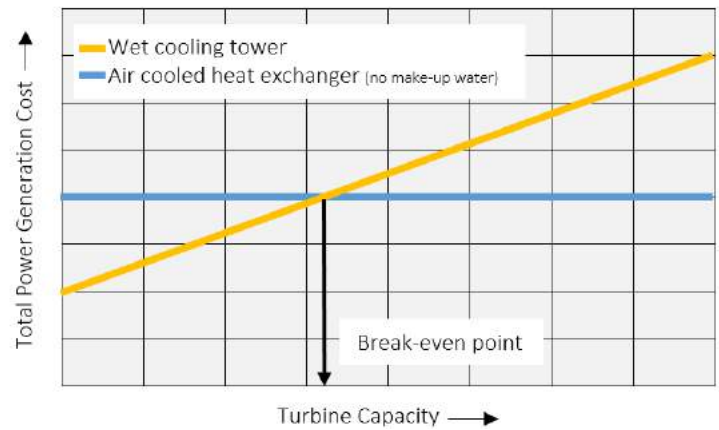
Dry vs Evaporative Cooling

Cooling is a significant part of any power generation cycle. ACCs are used to condense steam vapors from the steam turbine, lower heat rejection temperature and increase the power generation efficiency. Traditional evaporative cooling towers evaporate a fraction of the circulating water to achieve cooling. The requirement for make-up water gets exorbitant for large capacity power plants, thereby making the whole project unfeasible in many cases due to water shortage. We have a tremendous amount of skill set to thermally optimize ACCs as per the local prevailing conditions and customer requirements.



Criteria for choosing

- Water availability
- Capital and running costs
- Environmental constraints (plume, noise, height)
- Areal footprint



Many time dry cooling is preferred over evaporative cooling, even if water is available because the requirement of treated water and pumps add complexity and increase capital and running costs. ACCs on the other hand offer a modular solution.

Comparison- Dry vs Evaporative

Particulars	Evaporative Cooling	Dry Cooling
Min. approach	2-4 °C	6-8 °C
Cooling medium	Water	Air
Primary equipment	Cooling tower, surface condenser	Air cooled condenser
Auxiliary equipment	Water treatment plant, pumps	None
Maintenance	High	Low
Effluent treatment	Necessary	Not required
Plant location	Near a water source	No criteria



Applications

NSCT air cooled heat exchangers perform in all industrial sectors including power generation, oil and gas, chemical, bio fuel and process industries. We specialize in the design, manufacture and installation of ACHES of both A and V-frame (for vacuum applications) and horizontal type (for overpressure applications).

Thermal Design

- Our design and rating engineers have the know-how to handle a wide range of tube-side fluids including hydrocarbons, refrigerants, water and glycol.
- Comprehensive industrial design software packages are used to design and rate air cooled heat exchangers.
- All thermal and mechanical designs conform to Heat Transfer Research Institute (HTRI), American Petroleum Institute (API) and American Society of Mechanical Engineers (ASME) standards.

Quality Assurance and Testing

All internals are thoroughly tested for quality at all stages of the manufacturing process. Our dedicated Quality Engineering team checks all incoming and outgoing products.

Testing includes

- Hydraulic testing
- Pneumatic testing
- Submerged leak test
- Nondestructive tests



Mechanical Equipment

Fans

We manufacture low noise and power saving fans both in molded FRP and cast aluminum. Each NSCT fan passes through a quality inspection. The hub is dynamically balanced while the whole fan assembly is statically balanced. We our fans range from 3 ft. to 11 m in diameter.



Gear Boxes

We manufacture right-angled, single and double reduction gear boxes for air cooled heat exchangers. They are designed for continuous operation in rugged conditions. The casing is designed to dampen noise and vibrations and the heavy duty bearings for combined radial and thrust loadings. Each batch of gear boxes is dynamically load tested for vibrations, noise and temperature rise. All our gear box models are designed as per AGMA and CTI standards. NSCTPL gear boxes have a proven record for long service life without product downtime.

*Please refer to our Gear Box Catalog for more details.



Motors

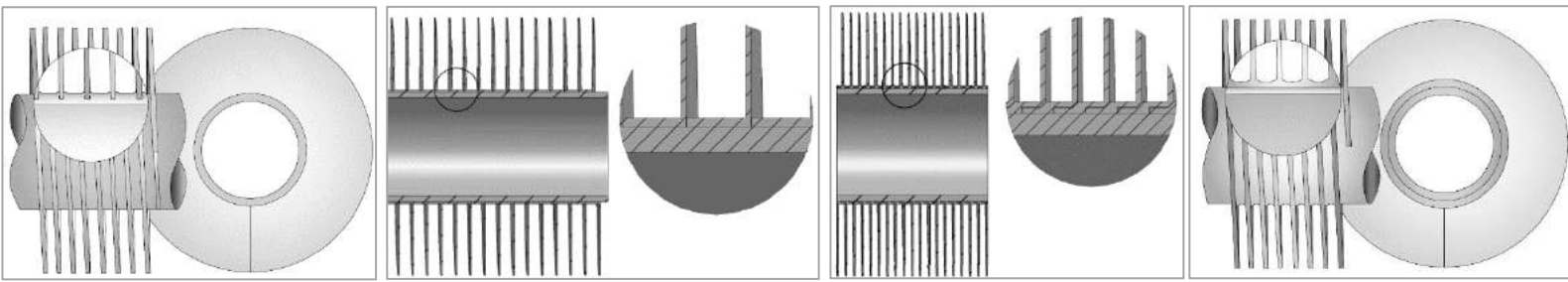
We supply totally enclosed fan cooled induction motors for both single and dual speed operations. Variable frequency drives are also supplied as per the operation requirements.

Multi Row Finned Tubes

ACHes consist of modules of finned tubes bundles that provide extended areas for heat transfer. The heat transfer performance of an ACC extensively depends on the fin performance. Conduction of heat takes place from the fluid (liquid or gas) through the tube to the fins and convection takes place from the fins to the ambient air. We offer multiple types of finned tubes depending on the application.



Finned Tube Types



Embedded- G Fins

Wrap on- L Fins

Wrap on- Double L Fins

Bi-metallic- E Fins

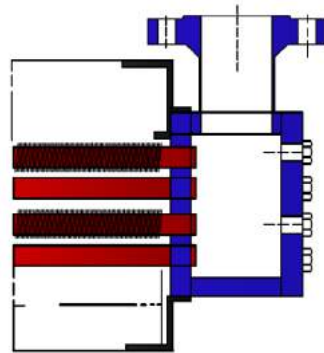
Finned Tube Properties

Properties	Embedded- G Fins	Wrap on- L Fins	Wrap on- Double L Fins	Bi-metallic- E Fins
Max. working temperature	400 °C	130 °C	130 °C	300°C
Mechanical resistance	Poor	Good	Good	Excellent
Corrosion resistance	Acceptable	Good	Good	Excellent
Fin metal	Al/ Cu/ SS	Al/ Cu	Al/ Cu	Al
Tube metal	Mechinable metal	Any metal	Any metal	Any metal

Header Types

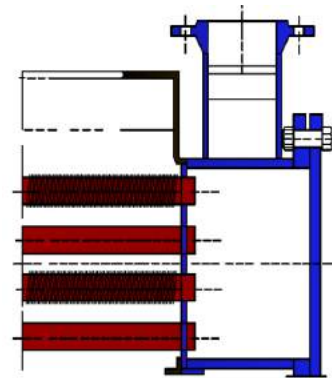
Plug Type Header

Each tube has a corresponding plug that can be easily unscrewed for cleaning and maintenance. The dismantling of the tube connection is not required since the nozzles are either at the top or the bottom of the header.



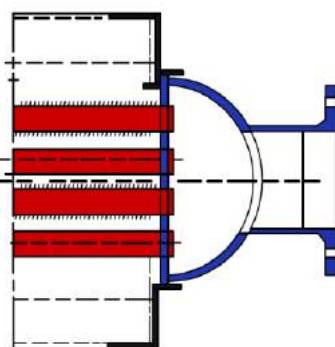
Cover Plate Type Header

The inlet and the outlet nozzles are arranged at the top and at the bottom so the cover plate can be removed to have an unrestricted access to the tube sheet without dismantling any tubes. This type is normally used in cases where the tubes need periodic maintenance and the service pressures are below 275 bars.



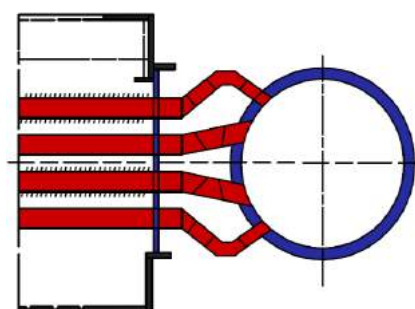
Completely Welded Type Header

Normally used for clean fluids due to which, the headers do not require regular maintenance. The tubes are welded into the tube sheet and the D type header is welded with the required nozzles.



Manifold Type Header

For high pressure applications above 275 bars, the tubes are directly welded into a pipe of an appropriate schedule number to function as a header.



Single Row Condenser Tubes

Aluminum clad steel core tube with brazed aluminum finning

- Lower fan static pressure
- Lower turbine back pressure
- Higher tube-side heat transfer coefficient
- Freeze protection under sub-zero temperatures
- Lower noise levels
- High thermal performance at all temperatures



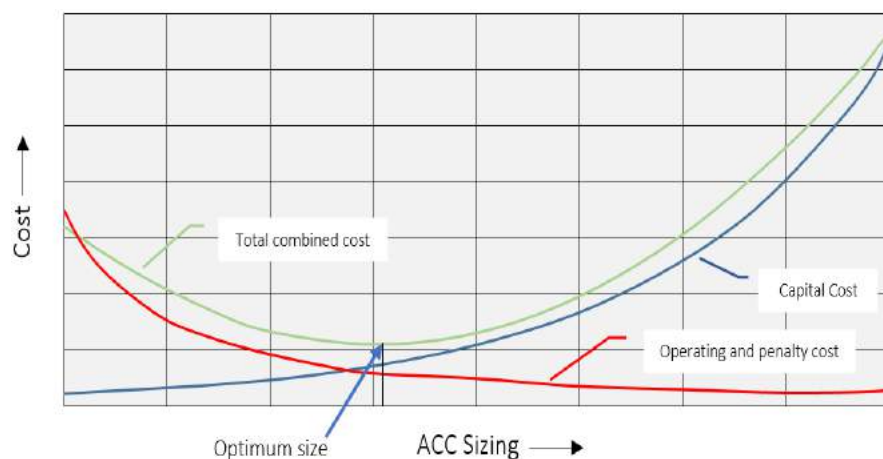
Scope of supply- ACCs

For guaranteed performance our scope of supply starts right at the turbine exhaust flange.

- Steam ducting and piping
- Valves
- Fan drive with gear boxes
- ACC bundles
- Structure
- Wind walls
- Air evacuation system
- Condensate tank
- Condensate extraction pumps
- Isolation valves, rupture discs, vacuum breakers
- By-pass system
- Cleaning system
- On-site installation, commissioning and technical documentation

ACC Sizing

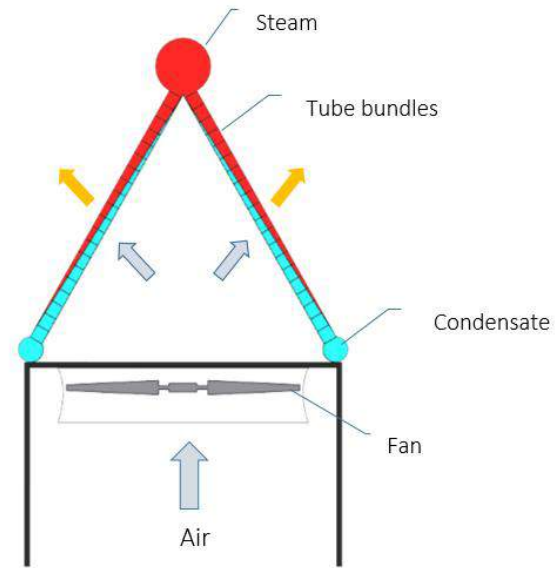
The size of an ACC is proportional to its capital and running costs. However, a large capacity (oversized design) ACC will perform even at high ambient temperatures, thereby reducing turbine backpressure and increasing the plant output. Therefore, a careful feasibility analysis is necessary at the initial stages of a project to determine the most optimum ACC size. Our engineering team can help the customer at all stages of the project.



Design Configurations

A-Frame ACCs

Generally an ACC consists of a number of bays which form a unit. Each bay is serviced by an axial flow fan, driven by an electric fan via a gear box. On each side of the bay, there are a series of tube bundles. Each tube bundle consists of a number of finned tubes which offer extended surfaces for heat transfer. The outlet steam from the steam turbine, flows into the steam manifold located on top of the tube bundles and enters the finned tubes through the inlet headers. The fan delivers a flow of air which passes through the tube bundles and takes away the latent heat of condensation from the steam flowing through the tubes. The condensate flows down with gravity and is let out through the outlet header of the tube bundles.



V Frame ACHes

- Low vibrations
- Lower exit air recirculation
- High performance even at high wind velocities
- Lower areal footprint



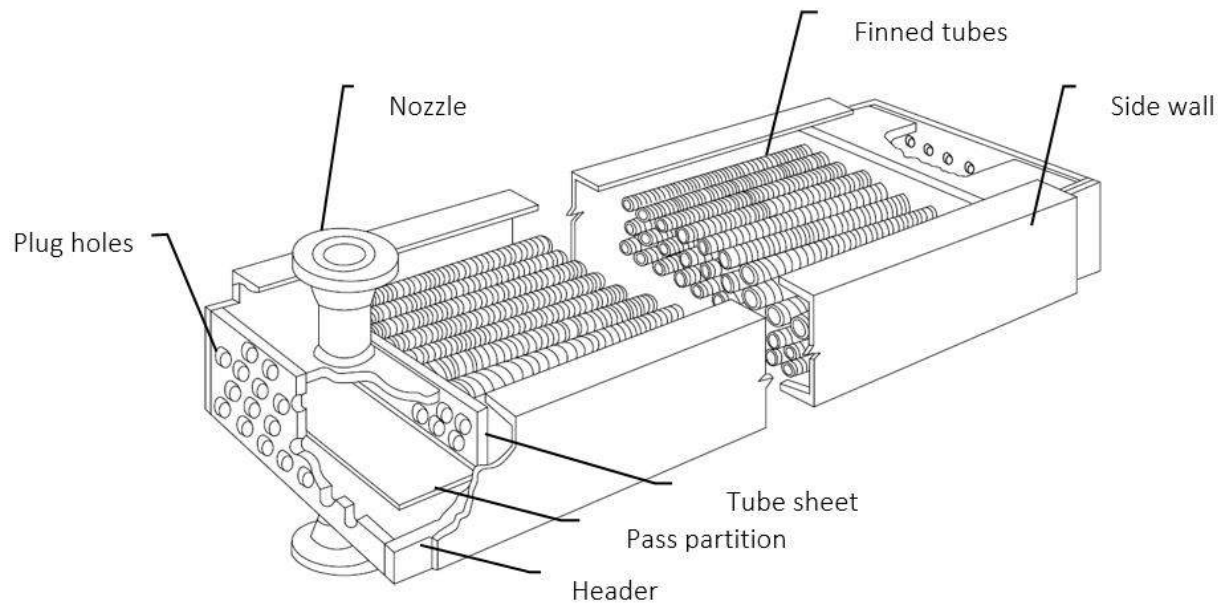
Horizontal Frame ACHEs

They are used in almost all industrial sectors including chemical plants, process industries, oil and gas industry, plastic industries, integrated iron and steel works, rubber plants, synthetic spirit plants, etc. They are well suited for high temperature and pressure applications under corrosive environments. Applications include gas cooling, condensation and cooling of hydrocarbon streams, gas re-injection, cooling of heavy oils, etc. We are capable of handling a wide range of tube side fluids under varied operating conditions.

They find a special use where wet cooling systems cannot be used such as in off-shore, arctic and humid locations.



Tube Bundle

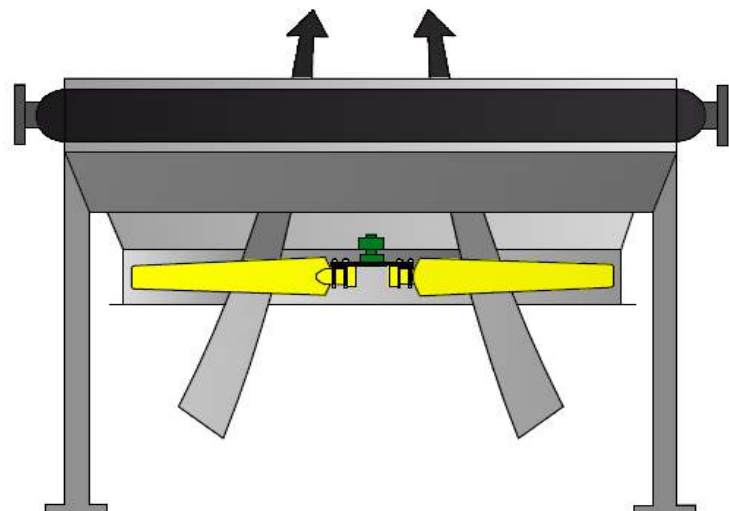


Forced Draft Horizontal Frame ACHEs

The fans are located at the air stream inlet below the finned tube bundles.

Advantages

- Easy to service and replace finned tube bundles
- Lower power consumption per unit air mass flow rate
- Higher drive unit service life

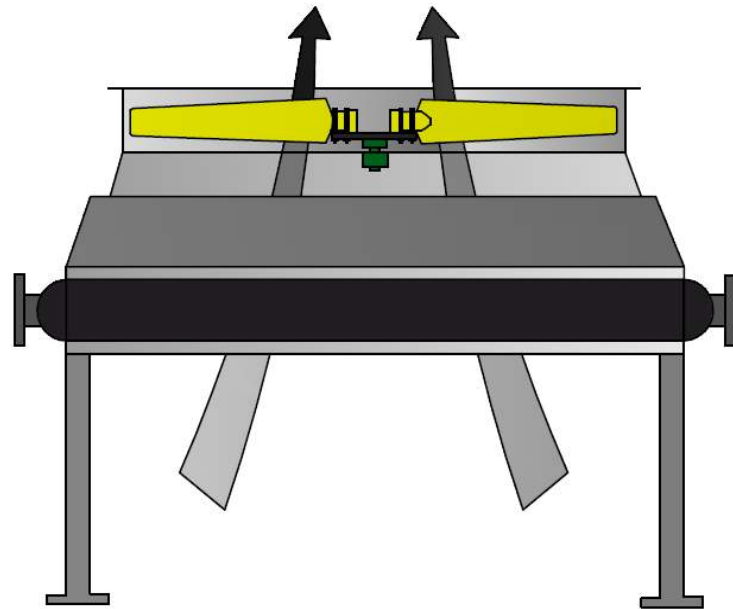


Induced Draft Horizontal Frame ACHEs

The fans are located at the exit of the hot air stream, above the tube bundles.

Advantages

- Low air recirculation due to higher exit air escape velocity
- Higher uniformity of air distribution across the finned tubes
- Lesser susceptible to degradation in performance in windy conditions



Design configurations and types

Design configurations

- Horizontal
 - Forced draft
 - Induced draft
- A frame
- V frame

Design codes and standards

- American petroleum Institute (API) 661 and 660
- Tubular Exchanger Manufacturers Association (TEMA)
- American Society of Mechanical Engineers (ASME) Section VIII Division I and Division II- 'U' Stamp
- ISO 9001: 2008 quality management system

Structure

- Galvanized steel
- Reinforced cement concrete

Design conditions

- Pressures: Full vacuum to 300 bars

Tube bundles design

- Single row: Al clad steel tubes with brazed Al fins
- Multi row: L, Double L, G and extrude fins
- Fin frequency: 6 to 11 per inch
- Tube diameters: $\frac{3}{4}$ " to 2"
- Max. tube length: 12 m

Tube materials

- Carbon steel
- Stainless steels (SS 304, 316, 316 L)
- Copper
- Cupronickel
- Aluminum
- Titanium
- Inconel and Incoloy

Fin materials

- Aluminum
- Copper
- Galvanized steel

After Sales and Services

All NSCT equipment's are designed to minimize product downtime. Proper inspection and maintenance of heat exchangers is very important for optimal operation and long service life. Our service and maintenance team remains dedicated to attending all our customer needs.

- Mechanical equipment inspection and replacement
- Internal and external finned tube inspection
- Tube bundle replacement
- Fin cleaning
- ACC thermal performance evaluation
- ACC bay extension





NSCT Heat Exchangers

North Street Cooling Towers Pvt. Ltd.

C-14, Sector- 22, Meerut Road Industrial Area,
Ghaziabad- 201003, UP, India.

Phone No: +91-120-2788571, 2788572, Fax No: 91-120-2788574

E-mail: Sales@nsctpl.in; mehul@nsctpl.in

Website: www.nsctpl.com



EX II 2G c T5

