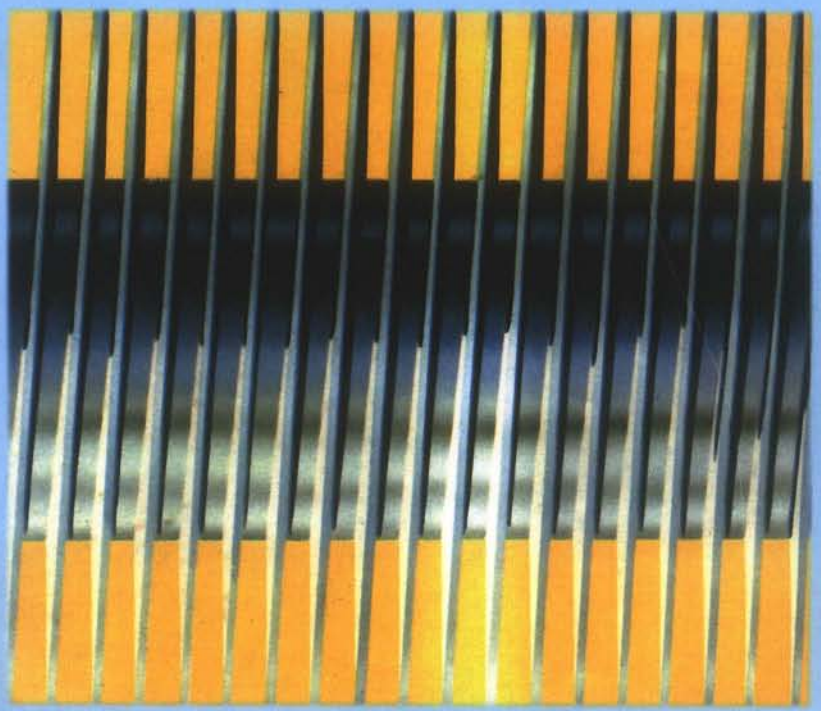
AIRCOOLERS



finned tube
HEAT EXCHANGERS

PAHARPUR

Paharpur Cooling Towers Limited

An ISO 9001 COMPANY

INTRODUCTION

Paharpur air-cooled heat exchangers are produced by Paharpur Cooling Towers Limited, long recognised as a leader in India in the design and fabrication of heat exchangers. Paharpur's thoroughly sophisticated engineering and manufacturing resources and its standard of excellence and reliability in heat transfer equipment stand behind every product of Paharpur.

A variety of key industries are served by Paharpur airCoolers, each custom engineered for the particular application, utilizing components specifically designed for air-cooling duty. Supported by know-how from HTFS, U.K., Paharpur airCoolers are designed, manufactured and tested by Paharpur's team of experienced engineers and skilled technicians to solve today's unique and ever more complex process cooling demands. To meet these requirements, the Paharpur product team can provide exchangers of virtually any capacity, metallic alloy or pressure range. As a result, Paharpur products are found in hundreds of applications throughout the chemical, petrochemical, petroleum, power, gas pipeline and other industries.

PRODUCTION FACILITIES

Paharpur's production facilities are located at Calcutta in the state of West Bengal and near Delhi at Sahibabad in the state of Uttar Pradesh. Here, heat transfer specialists, computer technology and wide ranging production, application and testing experience combine to produce the quality products of the Paharpur airCooler line.

Quality is the byword at Paharpur. In terms of equipment, quality means the latest tube finning machines, manual and automatic welders, radial drills and of course, computer controlled machining. Paharpur have access to first class stress relieving facilities. In terms of personnel, quality is reflected in the seasoned knowledge of specialists and the skilled hands of technicians. At Paharpur, this combination of men, methods and machines, has its result in design and construction excellence and state-of-the-art achievement.

THERMAL RATINGS

An air-cooled heat exchanger must perform reliably and efficiently under variable conditions. Thus, the requirements of each particular cooling duty are thoroughly analyzed, utilizing published heat transfer data and research data obtained from HTFS. The use of sophisticated computer modelling techniques allows Paharpur engineers to analyze projects in terms of performance, climate, stress and other factors affecting exchanger design and operation. Needed information is provided fast and accurately permitting intensive study and contributing to optimum design in terms of cost and performance.

This capability, combined with the vast experience gained in designing cooling systems for a variety of heat transfer problems, allows Paharpur to custom-design and construct air-cooled heat exchangers for nearly all applications.

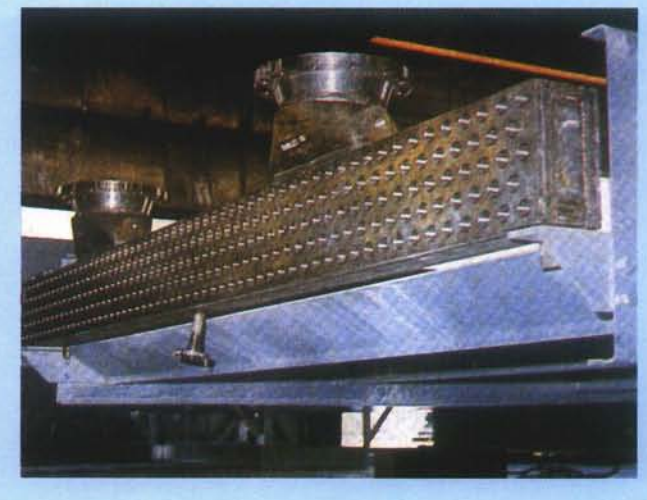
GENERAL DESIGN

Paharpur airCoolers are produced in forced or induced draught designs, and in single or multi-fan arrangements, depending upon operating requirements or customer specifications. Plug or cover type headers in carbon or stainless steel, with finned tubes of embedded, wrap-on or extruded type, designed to API and ASME standards are the most common combinations manufactured.

Standard airCooler units are pre-fabricated and assembled at the Paharpur plants. Larger units are sub-assembled for field erection.

FEATURES

- Over 15 years of experience with 400 units in service
- Thermal designs conform to HTFS norms
- Design pressures upto 160 bar
- Complete header box range (Plug, Cover, Manifold, D Type)
- Complete finned tube range (L, G, extruded)
- Comprehensive process control options (steam coil, louvres, warm air recirculation)



HEADERS

Paharpur will custom-design and fabricate headers of carbon steel, stainless steel, aluminium, nickel, monel or virtually any other material compatible with air-cooled heat exchanger applications. Construction is in accordance with Section VIII of ASME Boiler and Pressure Vessel Code for Unfired Pressure Vessels.

The fabricated box type header is Paharpur's standard for design pressures upto approximately 160 kg / cm^2. In this type of header a gasketed shoulder plug is provided opposite each tube end for tube accessibility. For applications which require access to the header box interior, Paharpur provides removable cover headers.

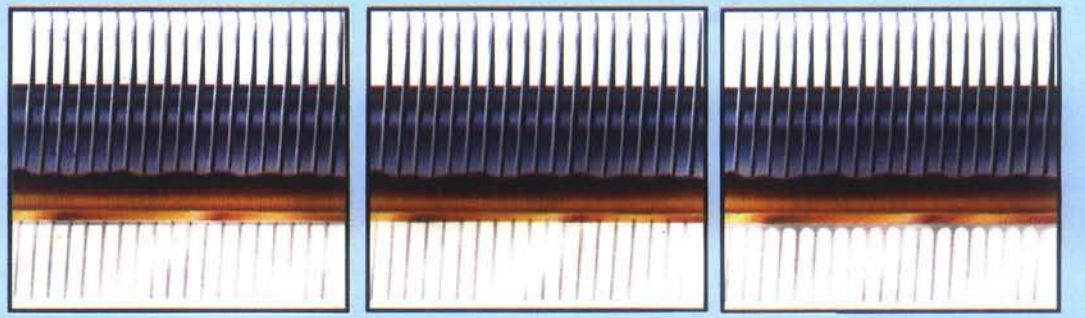
Paharpur airCooler headers and tubes are shop assembled into complete sections, or "bundles". Heavy side channels and tube racks assure positive support below and above the tubes. Tube to tube sheet joints are normally roller expanded, but if specified, they may also be welded.

	PLUG TYPE	COVER TYPE
API 661	Yes	Yes
Tube Access	Easy(1)	Very Easy(2)
Tube mechanical cleaning	Easy	Easier
TUBE TO TUBE SHEET JOINT		
Tube Expansion	Yes	Yes
Seal Welding (3)	Yes	Yes
Strength Welding (3)	Yes	Yes
Max. plate thickness handled	60 mm	75 mm
SERVICE		
Design Pressure, kg / cm^2	160	35
Hydrocarbon Service	Yes	Yes
Ammonia Service	Yes	Yes
Hot Water Service	Yes	
Wet H_2S Service		Yes
MATERIALS		
Carbon Steel	Yes	Yes
SS-304L	Yes	Yes
SS-316	Yes	Yes
SS-316L	Yes	Yes
SS-321	Yes	Yes

NOTES:

1. Each plug gives direct access to one tube.
2. All tubes are simultaneously accessable but the cover must be removed.
3. Automatic welding machine for tube-to-tube sheet joint.

FINNED TUBES



a) tension-wound footed (L type) b) embedded edge wound (G type) c) integral extruded

FIN TUBE TYPE	L	G	EXTRUDED
CHARACTERISTICS			
Max. Operating Temp. (°C)	150	400	280
Mechanical strength	Poor	Good	Excellent
Resistance to cleaning	Poor	Good	Excellent
Corrosion	Good	No tube protection between fins	Excellent
COST			
Only fin tubes	Base (100%)	104%	120-125%
Complete Air Cooler	Base (100%)	101%	105-110%

MECHANICAL EQUIPMENT

By definition, an air-cooled heat exchanger requires air. More precisely, it requires large quantities of air, distributed uniformly and efficiently. To achieve these goals Paharpur furnishes mechanical equipment designed specifically for heat transfer applications.

Fans. Statically balanced multiblade fans designed and built by Paharpur airCoolers - for good reason. are used on most Paharpur applications, these adjustable pitch Proven in thousands of (AVP) fans yield high performance or Automatic Variable Pitch durable and readily available. When characteristics, are extremely provide special duty fans and specified, Paharpur can also variable frequency drives.

Speed Reducers. V belt or geared speed reducer drives may be specified for Paharpur airCoolers.

When geared speed reducers are specified, Paharpur provides the finest time-tested spiral bevel gearboxes manufactured in-house. Designed for continuous operation under tortuous conditions, these rugged units are in use in thousands of installations throughout the world, attesting to their reliability in any application.

Drivers. A high quality TEFC or explosion proof induction electric motor is the standard drive for a Paharpur airCooler fan. These motors are available with several manufacturer's options.

Other types of drive systems, including gas or gasoline engines, steam or gas turbines, and hydraulic systems can also be provided.

QUALITY ASSURANCE

Quality is a Paharpur byword. To have any meaning, however, this over-used word must have a precise definition. At Paharpur, quality means a standard of excellence applied to every phase of operations. It begins with world famous designs from HTFS and continues in Paharpur's Research and Development Centre, which maintains a totally integrated, multiproject research facility, dedicated to the development of advanced product designs, product components and materials utilization. This activity is specially vital in meeting today's concern for increased efficiency, performance and reliability.

This standard of excellence - of quality - continues into and beyond the final design and production stages. It is characterized by appropriate material selection, strict tolerances precise assembly, and mostly, by the dedication of skilled and experienced people at every stage.

Quality Assurance inspections assure that all products and procedures reflect the Paharpur standard. Material handling, fabrication and welding operations are subject to critical examination, in addition to ASME Code specifications. And inspection by radiographic, ultrasonic, magnetic particle and liquid penetration techniques provides final assurance of reliability in materials and workmanship.

Paharpur encourages customer visits to its general office and manufacturing facilities.

Paharpur airCoolers are regularly subjected to inspection by agencies like Lloyds, Jacobs H & G, PDIL, Engineers India Ltd, BHEL etc.

AFTER SALES SERVICE

The Paharpur sales / service network ensures service engineers are available promptly for attending to any application and field related problems.

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