

PAHARPUR



SERIES 6.1 KF

**UNIQUE MODULAR CROSS-FLOW
COOLING TOWERS IN FIBREGLASS
CONSTRUCTION**



CORROSION-PROOF CONSTRUCTION



Fibreglass hot and cold water basins won't corrode, rot or decay. All steel components, including assembly hardware, are hot dip galvanized steel.

The GRP casing enhances aesthetics of the tower and at the same time does not corrode, rot or decay.

The GRP cold water basin is adequately sized and is available with side outlet as standard and bottom outlet as optional. Standard equipment on each tower basin includes a screened suction connection, a threaded overflow and drain connection and float-operated make-up valve. Access to the interior of the tower is available through an access door on one side of the casing just above the cold water basin.

PROVEN PAHARPUR MECHANICAL EQUIPMENT



Paharpur's own make quiet induced-draft propeller fan is driven through a Paharpur right-angled gear box. The TEFC motor is located outside the moist air stream.

The Paharpur Series 10P, 20T and 22.2 gear boxes used in 6.1 KF towers have a long record of dependability, long service life and low maintenance cost. Each gear box is equipped with a lube line that extends outward to an oil level dipstick/sight glass adjacent to the motor. All normal mechanical equipment maintenance, including oil changes, can be accomplished from outside the cooling tower.

The gear box is coupled to the TEFC motor through a Paharpur full-floating driveshaft whose HDG steel tube and non-lubricated neoprene flexible elements assure long, maintenance-free service. Heavy-gauge HDG steel members support the gear box and fan motor, maintaining correct alignment throughout the drive train.

The Paharpur type H-3 fans used in the 6.1 KF towers are equipped with cast aluminium alloy blades. Blades are adjustable in pitch, permitting maximum utilization of rated horsepower, or allowing field adjustment to compensate for abnormal job-site restrictions. Paharpur fans do not require costly accessories for pitch adjustment. If required, GRP fan blades are available as optional equipment



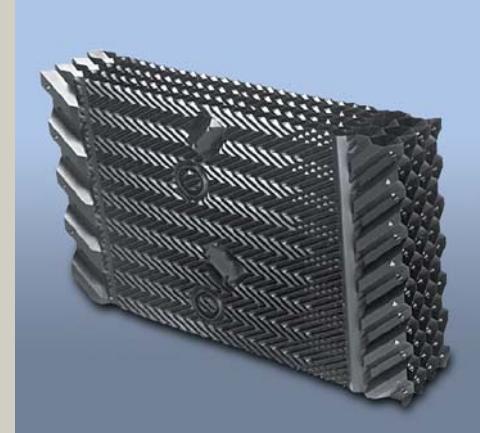
A high quality TEFC weatherproof induction electric motor is the standard drive for a Paharpur 6.1 KF tower. Options include explosion proof construction and pole changing 2-speed design. Paharpur manufactures all the mechanical equipment (except the motor) in its own plants. So, service parts are readily available from a single source.

EFFICIENT PVC FILM-TYPE FILL

PVC fill sheets are manufactured from virgin PVC at Paharpur's own Bhasa plant, equipped with sophisticated machinery. The fill sheets have integral louvres & drift eliminators. The sheet profile ensures proper heat transfer is achieved throughout the travel length.

The integral drift eliminators prevent the costly nuisance of drift spotting on the surrounding environment. They reduce drift to only 0.005% of the circulating water-flow rate.

The vacuum formed 12 mil (.305mm) thick PVC fill sheets withstand hot water temperatures as high as 55°C. Their shape minimizes resistance to airflow. Galvanized iron structural tubes support and stabilize the fill. They also hold the bottom of the fill sheets above the cold water basin floor to simplify basin cleaning. PVC tubes through the bottom of the fill prevent distortion and wear & tear of the fill under the load of the falling water.



WATER DISTRIBUTION SYSTEM

Warm water flows through external piping (not included with the tower) into a chamber at the top of the tower. This splash box prevents the incoming water from spilling out of the basin and helps provide uniform water distribution. Water then flows by gravity from the fibreglass basins through nozzles to the fill.

All 6.1 KF towers use Paharpur "Target" nozzles. These inert polypropylene plastic nozzles assure uniform water distribution throughout the fill. Nozzles are easy to remove and replace if you ever need to change the design water flow rate.

Fibreglass removable covers (available as optional extra) prevent algae growth in the hot water basins and provide a smart finished appearance to the tower.



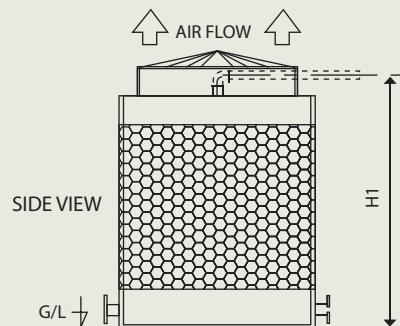
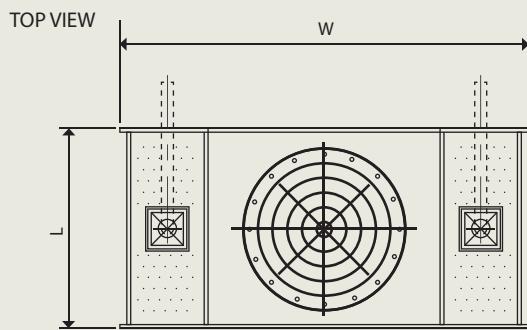
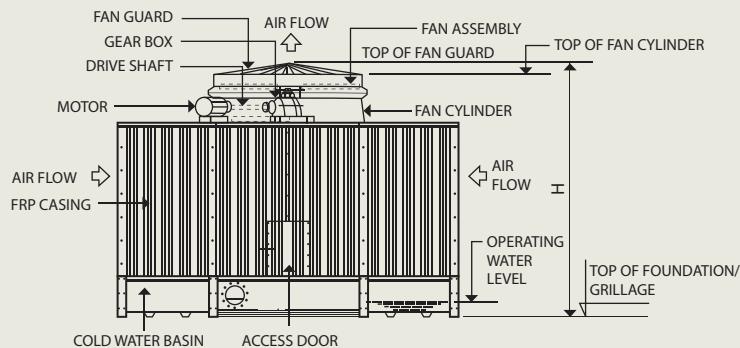
EASY MAINTENANCE

All maintenance on the mechanical equipment can be accomplished from outside the tower. Distribution basin and nozzles can be easily cleaned even while the tower is in operation.



ENGINEERING DATA

FRONT VIEW



Note : Dotted piping is out of our scope of supply.

All Dimensions are in mm unless otherwise specified

Tower Model	L	W	H	H1	Motor (HP)	Fan RPM	Shipping Wt. (kg)*	Operating Wt. (kg)**
6111	2071	5100	3285	2675	5.00	555	1485	4515
6112	2071	5100	3285	2675	7.50	555	1495	4525
6113	2071	5100	3285	2675	10.00	535	1595	4625
6121	2526	5100	3305	2675	7.50	555	1695	5485
6122	2526	5100	3305	2675	10.00	535	1780	5570
6131	2836	5100	3376	2675	15.00	444	1870	5650
6132	2836	5100	3376	2675	20.00	535	1960	6260
6133	2836	5100	3376	2675	25.00	535	2060	6360
6141	2526	5710	4195	3570	20.00	535	2325	6525
6142	2526	5710	4195	3570	25.00	535	2425	6625
6151	2836	5710	4210	3570	20.00	444	2500	7270
6152	2836	5710	4210	3570	25.00	444	2520	7290
6153	2836	5710	4210	3570	30.00	444	2555	7325
6161	3442	5710	4210	3570	25.00	444	2860	8760
6162	3442	5710	4210	3570	30.00	444	2910	8810
6163	3442	5710	4210	3570	40.00	420	2960	8860
6171	3746	5932	4255	3570	40.00	420	3145	9845
6172	3746	5932	4255	3570	50.00	420	3160	9860
6181	3746	5932	4970	4285	50.00	420	3405	10705
6182	3746	5932	4970	4285	60.00	420	3460	10730
6191	4201	5932	5605	4920	40.00	320	3670	11670
6192	4201	5932	5605	4920	50.00	320	3735	11760
6193	4201	5932	5605	4920	60.00	320	3775	11825

L = Length

W = Width

H = Height

H1 = Height of the center of hot water inlet pipe

*Shipping weight does not include optional additions

**Operating weight includes water in cold water basin up to overflow limit

Table Notes:

- All heights are measured from top of foundation/grillage.
- All table data is per cell for Tower with Basin models.
- All piping and supports are by others.
- Obtain certified drawings from Paharpur after order, before doing detailed engineering.

6.1 KF ON-SITE ASSEMBLY

6.1 KF towers are factory-fabricated, and are designed to be assembled at the jobsite. This allows the design flexibility that results in the uniquely pleasant 6.1 KF configuration, and permits a wide variety of orientations.

Normally this assembly is included as part of the cooling tower contract (at extra price), and is performed by a team of workmen supervised by an experienced Paharpur erection foreman. Their knowledge and expertise assure proper fit-up, alignment, sealing, and warrantability of the various tower components - and contributes significantly to the trouble-free long term operation of the tower. Therefore, Paharpur strongly recommends that complete tower erection be included as part of your order.



Although a reasonable concern for safety is inherent in the design of Paharpur cooling towers, specifiers, purchasers, and users must understand that there is always some risk involved in operating and maintaining this type of equipment. Accordingly, cautionary warning decals dealing with safety are placed on all Paharpur towers, which should be strictly adhered to. Please refer to the tower's Operating and Maintenance manual for more complete safety precautions.



Caution

The cooling tower must be located at such distance and direction to avoid the possibility of contaminated tower discharge air being drawn into building fresh air intake ducts. The purchaser should obtain the services of a Licensed Professional Engineer or Registered Architect to certify that the location of the tower is in compliance with applicable air pollution, fire, and clean air codes.

OPERATING AND ENVIRONMENTAL CONSIDERATIONS

ENCLOSURES

Occasionally, cooling towers are located inside architectural enclosures for aesthetic reason. Although the Paharpur cooling towers adapt well to enclosures, the designer must realise the potential impact of a poorly arranged enclosure on the tower's performance and operation.

The designer must take care to provide generous air inlet paths, and the minimum distance specified should be observed.

NOISE LEVEL

Sound produced by a series 6.1 KF tower operating in an unobstructed environment will meet all but the most restrictive noise limitations and will react favourably to natural attenuation. Where the tower has been designed to operate within an enclosure, the enclosure itself will usually have a dampening effect on sound. Sound also declines with distance by about 5dBA each time the distance doubles. Where noise at critical point is likely to exceed an acceptable limit, you have several options listed below in ascending order of cost impact:

- In many cases, noise concerns are limited to night-time, when ambient noise levels are lower. Such situations are tackled by using two (2) speed motors in either 1500/1000 or 1500/750 rpm configuration; and operating the fans at reduced speed without cycling "after hours". This is a relatively inexpensive solution and pays for itself quickly in reduced energy costs.
- Where noise is a concern at all times (for example, near a hospital) the best solution is to oversize the tower so it can operate continuously at reduced (1000 or 750 rpm) motor speed. Typical sound reductions are 7 dBA at two-third fan speed or 10 dBA at half speed.
- Extreme cases may require inlet and discharge sound attenuator sections; however, the static pressure loss imposed by attenuators may necessitate an increase in tower size. This is the least desirable approach because of significant cost impact and because of obstruction to normal maintenance procedures.

APPROPRIATE 6.1 KF APPLICATIONS

TYPICAL APPLICATIONS

Although the 6.1 KF is a premium-value cooling tower targeted for those applications that demand a high degree of corrosion resistance-as well as an aesthetically pleasing appearance-it is routinely applied in virtually all normal systems requiring cold water for the dissipation of heat. Some common applications include:

- Condenser water service for air conditioning and refrigeration systems. (They are especially adaptable to Free Cooling applications).
- Jacket water cooling for engines and air compressors.
- Chemical and industrial processes.
- Batch cooling.
- Welder cooling.
- Plastic industry processes.
- Dairy, citrus, and other food industry processing where water contamination is not likely to occur.

APPLICATIONS REQUIRING SYSTEM MODIFICATIONS OR ALTERNATIVE COOLING TOWER SELECTIONS

Certain types of applications are incompatible with any cooling tower with PVC film-type fill, whether 6.1 KF or a competitive tower of similar manufacture. Some of these applications, which call for either system modifications or an alternative tower design are:

- **Water temperatures exceeding 55°C** - service life of PVC may be reduced. Use either a cold water by-pass or an intermediate heat exchanger between the load and the tower to limit hot water temperature.
- **Ethylene glycol content** - can plug fill passages as slime and algae accumulate to feed on the available organic materials. An intermediate heat exchanger or an alternative splash-filled Paharpur tower selection will solve the problem.
- **Fatty acid content** - found in processes such as soap and detergent manufacture and some food processing, fatty acids pose a serious threat for plugging fill passages. Usually an alternative splash-filled tower offers the best solution.
- **Particulate carryover** - often found in steel mills and cement plants, can both cause fill plugging and build up to potentially damaging levels on tower structure. Specially-selected spray-filled Paharpur towers will control the problem.
- **Pulp carryover** - typical of the paper industry and food processing where barometric condensers or vacuum pumps are used. Causes fill plugging which may be intensified by algae. An alternative Paharpur splash-filled tower is usually the best solution since intermediate heat exchangers must have flow passages large enough to pass pulp mass.

PAHARPUR 6.1 KF COOLING TOWER SPECIFICATIONS

DESCRIPTION

Supply and install an induced-draft, crossflow, field-erected GRP cooling tower of cells, as shown on plan. Tower shall be similar and equal in all respect to Paharpur 6.1 KF Model

PERFORMANCE

The tower shall be capable of cooling LPM of water from °C to °C at a design wet bulb temperature of °C. The cooling tower manufacturer shall guarantee the performance of the tower as installed according to plans.

CONSTRUCTION

The cold water basin, hot water distribution basin, fan deck, fan cylinder and access door shall be formed of inert glassfibre-reinforced polyester (GRP). All hardware, including structural columns shall be fabricated of HDG steel. This shall include the mechanical equipment support structure, fan guards, and all bolts, nuts and fasteners used in the construction of the tower. Stainless steel hardware is usually quoted when the hot water temperature is greater than 55 degrees Celcius or when the environment is highly corrosive or on request.

MECHANICAL EQUIPMENT

Fan(s) shall be propeller type, incorporating heavy duty blades of cast aluminium alloy or high strength, inert composite material (GRP). Blade pitch shall be individually adjustable. Fan(s) shall be driven through a right angle, industrial-duty, oil-lubricated, geared speed reducer. Speed reducers employing pulleys and belts will not be acceptable.

Standard motor(s) shall be HP, TEFC weather proof, squirrel cage induction type. Asynchronous speed and electrical characteristics shall be 1450 RPM, single winding, 3 phase, 50 hertz, 415 volts. Motor shall be located outside the humid interior of tower, in a corner on the fan deck. Dual speed motor(s), VFD motor(s) and motor(s) of high efficiency class are offered on request at extra price.

The motor shall be connected to the gear reducer by a dynamically balanced HDG steel driveshaft equipped with neoprene flexible coupling elements. A neoprene oil guage and drain line shall extend from the gear reducer to the

motor enclosure, and shall be equipped with an easily visible oil sight glass. The mechanical equipment for each cell shall rest on a rigid HDG steel support that resists misalignment between the motor and the gear reducer.

FILL, LOUVRES & DRIFT ELIMINATORS

Fill shall be film type, vacuum-formed PVC, with louvres and drift eliminators formed as part of the fill sheets. Fill sheets shall be individually suspended from galvanized iron structural tubing supported by the tower columns and shall be elevated above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash-out, and guaranteed drift losses shall not exceed 0.005% of the design water flow rate.

HOT WATER DISTRIBUTION SYSTEM

The GRP hot water distribution basin shall be equipped with metering orifice-type polypropylene nozzles to deliver incoming water by gravity to the fill. Nozzles shall be easily removable and replaceable. The hot water basin shall be covered by removable GRP covers that keep out sunlight and give a finished appearance to the tower.

Cold Water Basin & Accessories : The GRP cold water basin shall be sealed watertight and shall include a float-operated mechanical make-up valve, a 100 mm diameter overflow connection and an HDG steel debris screen with side outlet.

SCOPE OF WORK

The cooling tower manufacturer shall be responsible for the design, fabrication, and delivery of materials to the project site, and for the erection of the tower over supporting grillage provided by others.

WARRANTY

The manufacturer shall warrant the entire tower (including the motor) against deficiency in performance and failure due to defects in materials and workmanship for a period of atleast fifteen (15) months following shipment to the site, or 12 months after the date of startup, whichever is sooner, provided that the Purchaser shall give the company immediate written notice of the discovery of any such defects.

Note :

GRP cold water basin can be substituted by concrete basin (by purchaser). In this case, basin accessories will also be deleted from Paharpur's scope.



Your Full-Service Cooling Technologies Company
www.paharpur.com

Paharpur Cooling Towers Ltd

(ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007 Certified)

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Our sales representatives are located in several countries and Indian cities.
Contact information shall be made available on request.