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SERIES

AQ-3800

THE UNI-FLOW™ ADVANTAGE

FOR HVAC & SMALL INDUSTRIAL APPLICATIONS

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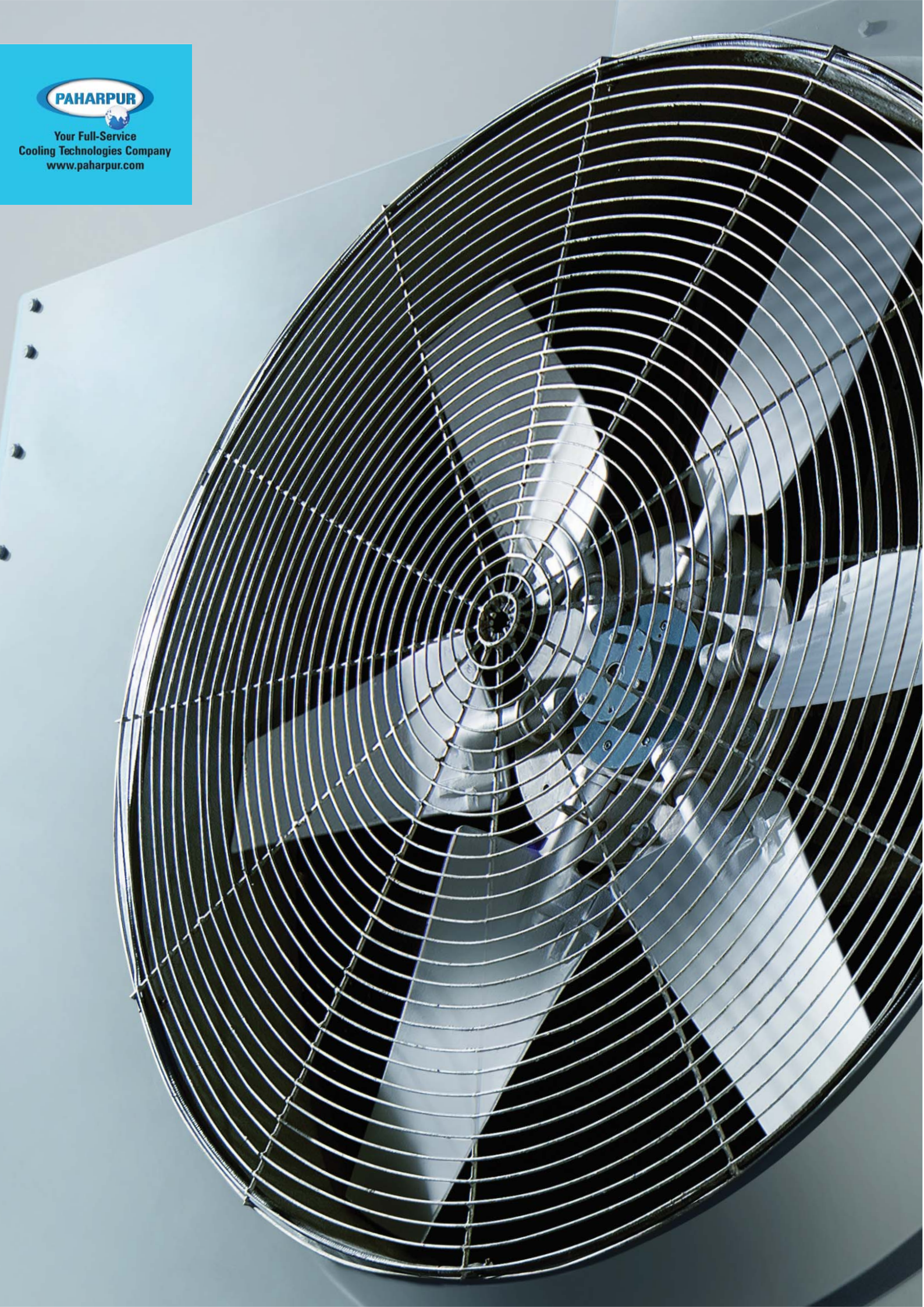

6 decades of providing customised cooling solutions

World's no.1 Manufacturer of both Wet & Dry cooling solutions

1,099 billion litres per day-total installed capacity.

66,000+ installations worldwide

100% manufacturing control

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66,000+
INSTALLATIONS
WORLDWIDE

100%
MANUFACTURING
CONTROL

1,099 BILLION
LITRES PER DAY
INSTALLED CAPACITY

Paharpur Cooling Towers is the world's only manufacturer with the complete range of wet & dry cooling technology. This makes us especially capable of providing the ideal customised solution for you.

NO. 1
IN WET & DRY COOLING TECHNOLOGY

Paharpur Cooling Towers' remarkable journey to the pinnacle of cooling tower manufacturing started in 1957. Over the years, Paharpur has designed, tested and produced customised solutions for clients across all industries. In spite of changing needs and industry standards, our policy of continuous refinement and improvement has helped drive industrial production worldwide.

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AQ-3817

AQ-3841

ONE-OF-A-KIND PACKAGED CROSSFLOW SOLUTION

FROM AN INDUSTRY-LEADING MANUFACTURER

The Paharpur Series AQ-3800 has been designed as a flexible, modular and efficient cooling solution ideal for commercial spaces — these features make it a truly universal HVACR tower.

The Series AQ-3800 is one of Paharpur's most competitive products and combines the advantages of compactness, modular design and online maintenance. Its range of operation services a majority of HVACR applications. The AQ series' unique design feature, horizontal discharge, is particularly advantageous in HVACR applications. Several design improvements over

For a complete list of the AQ series see page 22.

AQ-3870

Paharpur has sold more than 20,000 AQ towers worldwide

the last few decades have made the AQ series one of the most sought after and effective cooling towers in the HVACR industry.

FEATURES

Draught Type	Flow type	Material of construction	Water Flow rate (cmh/cell)	Fill type	Drive type
Induced/ Forced	Crossflow	FRP	3 - 200	Film/Splash	Belt

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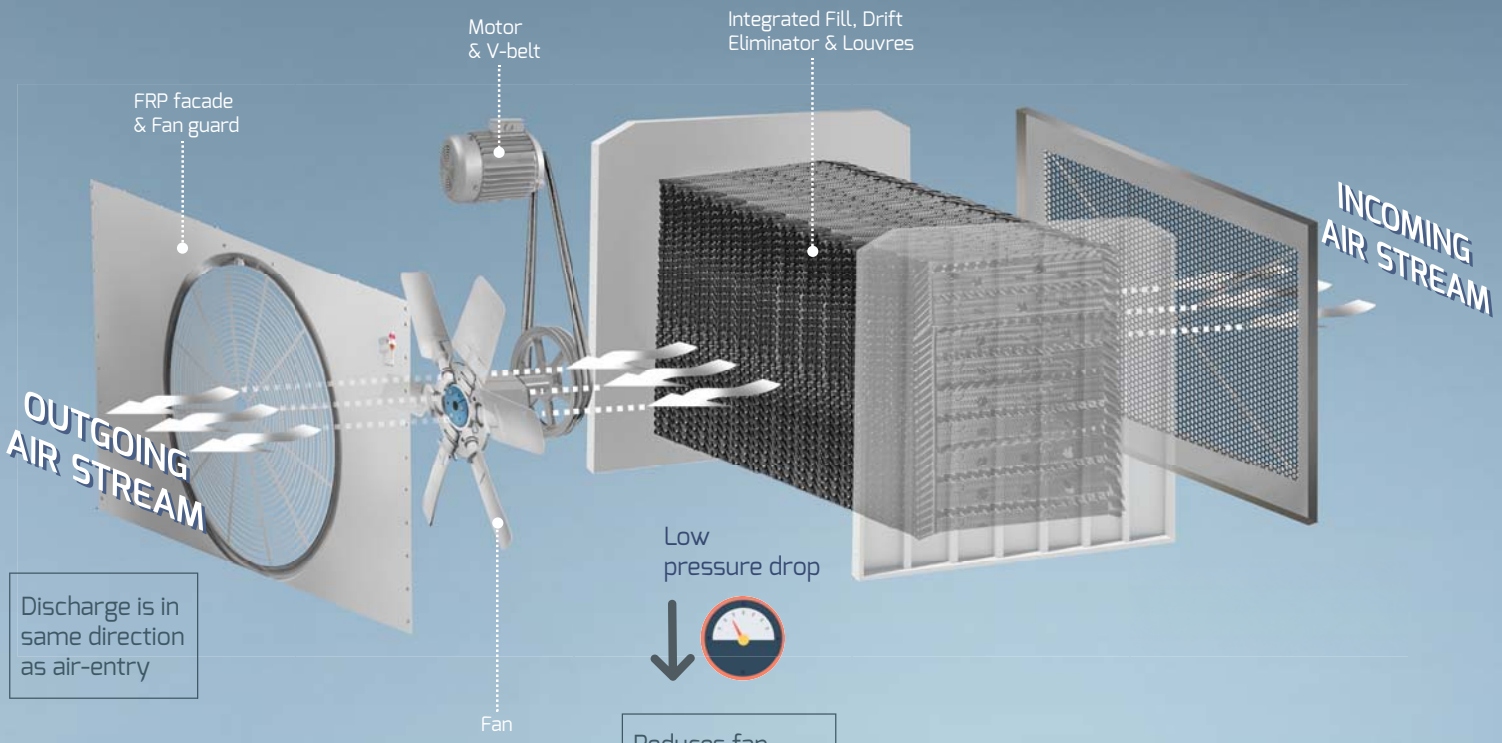
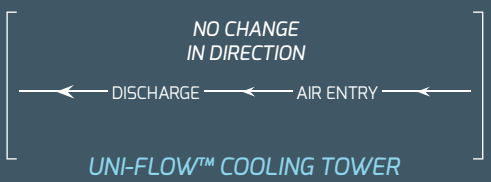
In a Uni-flow™ system, air-flow in a cooling tower does not change direction — air-entry and discharge are in the same direction. This unique feature presents some key advantages in HVACR applications.

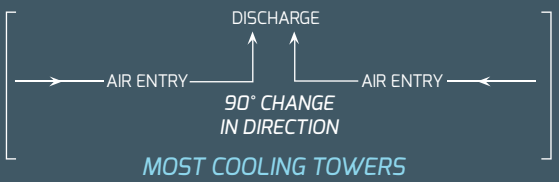
UNI-FLOW™ DESIGN
PRESENTS UNIQUE ADVANTAGES

Paharpur's AQ series is a Uni-flow™ crossflow cooling solution. This uncommon design feature presents advantages which resolve some very common challenges, like that of fogging (see page 8), unwanted sound and energy consumption in the HVACR industry. The advantages presented by the AQ series, in conjunction with reliable thermal performance and compact build are the reasons why it is one of Paharpur's most competitive products in the market.





UNI-FLOW™ COOLING TOWER



MOST COOLING TOWERS

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Series AQ-3800 is a Uni-flow™ cooling tower having horizontal discharge. This enables flexible orientation, reduces pressure loss and as a result solves typical challenges faced in the HVACR industry.

ZERO FOGGING & REDUCED SOUND
ARE UNIQUE ADVANTAGES OF UNI-FLOW™ DESIGN

HORIZONTAL DISCHARGE

Most cooling towers discharge moist air vertically. Our most competitive product for the HVACR industry is a Uni-flow™ tower with horizontal discharge, which has three major advantages:

Eliminates fogging on glass facade:
By directing cooling tower discharge away from the building, you can eliminate the nuisance of fogging on glass facades.

Minimises sound levels:
Flexible orientation also allows you to place your cooling towers such that the fan faces away from the building, reducing sound where it is objectionable.

Minimum pressure drop:

Whenever air-flow changes direction (usually by 90°) in a cooling tower, there is a pressure drop — this demands higher fan power. In a Uni-flow™ tower, since air-flow does not change direction, pressure drop inside the cooling tower is reduced. This reduces fan power consumption and helps save energy.

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Your building can benefit greatly with a Paharpur cooling tower because we can give you complete control over your HVACR system.

As a founding member of The Indian Green Building Council (IGBC), Paharpur is best equipped to help you build a truly smart building.

Indian Green Building Council
FOUNDING MEMBER

ACHIEVE PLATINUM RATING

FOR YOUR GREEN BUILDING WITH PAHARPUR'S ENERGY EFFICIENT HVACR COOLING TOWERS

HVACR systems consume nearly 50% of a building's total energy. Paharpur has the expertise to help you significantly reduce costs, preserve high performance and build a truly green building with the highest industry ratings. Reliable thermal performance helps conserve power; precise cold water temperature unburdens your chiller and reduces operating cost.

SOME PLATINUM RATED BUILDINGS WITH PAHARPUR'S COOLING TOWERS

- Infinity Benchmark, Kolkata
- Paharpur Business Centre, New Delhi
- Manyata Embassy, Bangalore
- ITC Mughal, Agra
- ITC Kakatiya, Hyderabad
- ITC Sonar, Kolkata

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INTEGRATED SYSTEM DESIGN

ENSURES RELIABLE THERMAL PERFORMANCE

An integrated system of parts performs better in all situations. All Paharpur products are designed as integrated systems – interactions between components are taken into account and the system is accordingly customised and optimised. This helps us always ensure reliable thermal performance.


STRUCTURE


NOZZLES


FILL WITH INTEGRATED DRIFT ELIMINATOR AND LOUVRES

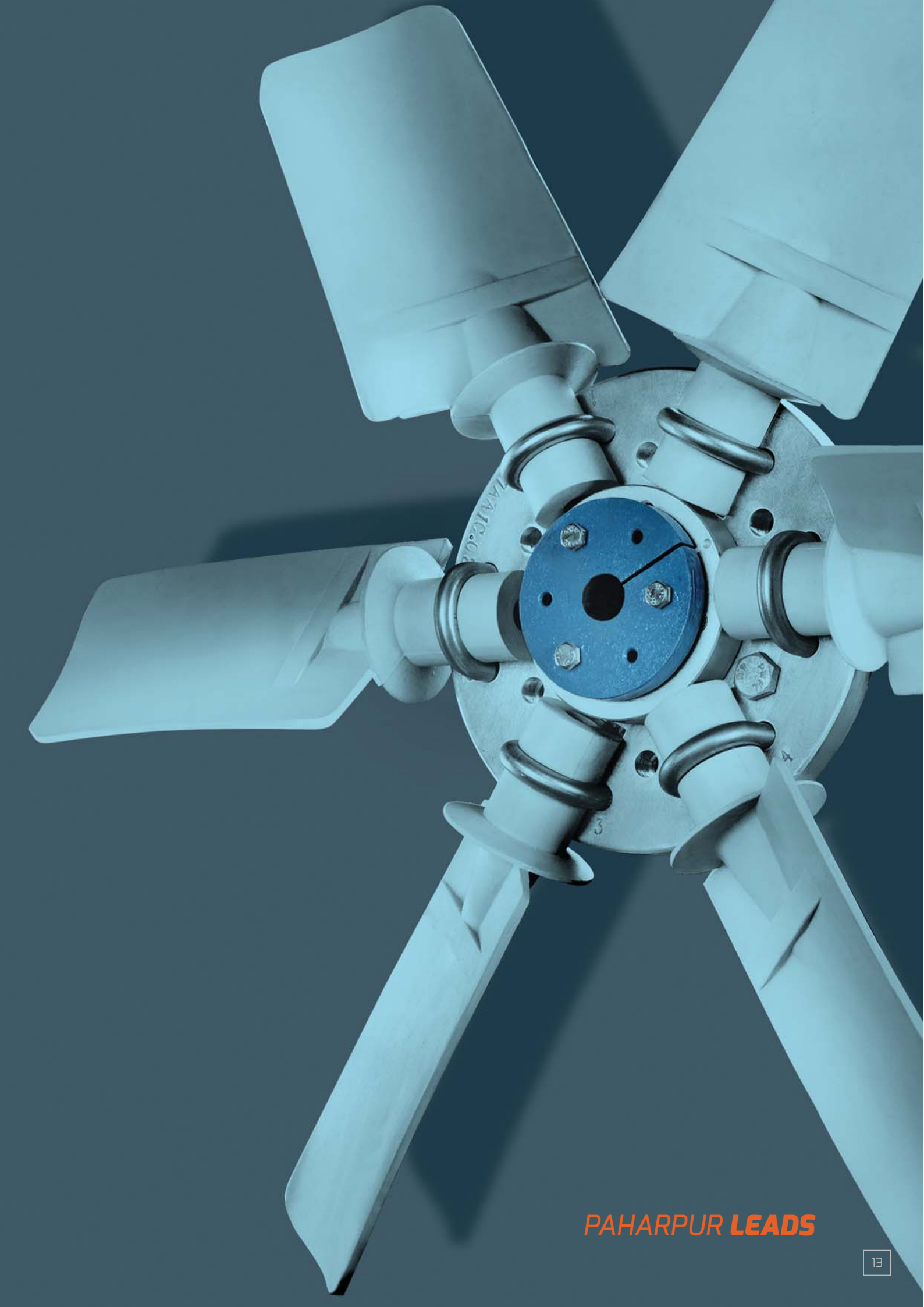

WATER BASINS


FAN


BEARING HOUSING


V-BELT

- Designed as a collective system of parts
- Customised according to interactions between parts
- 100% manufacturing control



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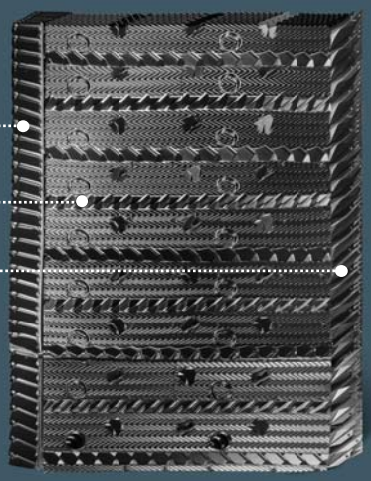
Unidirectional air-flow in the AQ Series significantly reduces pressure loss in the fill



- Drift reduced to 0.005% of water flow rate
- Fill sheets withstand hot water temperatures up to 55°C
- Fill sheet thickness – 0.3 mm (before forming)

MX75
FILL SHEETS WITH INTEGRATED DRIFT ELIMINATOR AND LOUVRES

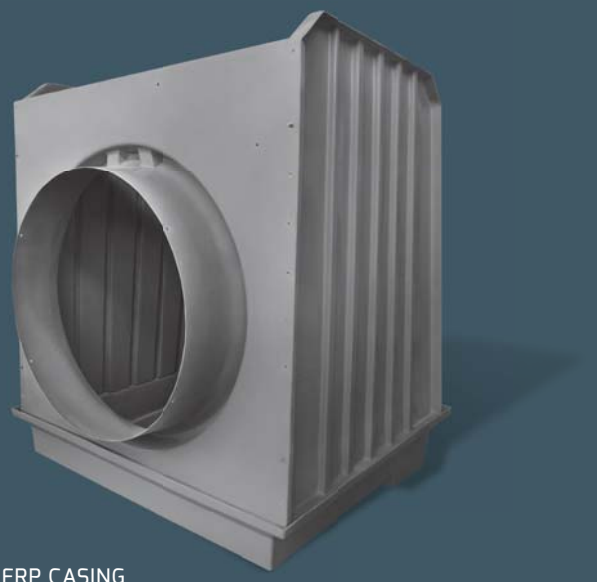
PRECISE COLD WATER TEMPERATURE

WILL MAINTAIN THE EFFICIENCY OF YOUR COOLING OPERATION

Paharpur's AQ Series comes equipped with MX75 fill. These vacuum formed film-type PVC fill sheets are designed for maximum cooling per unit volume; they are corrosion resistant and provide least possible restriction to air flow. Efficient drift eliminators and louvres are integrally moulded into the fill sheets. Drift eliminators bring drift down to 0.005% of the water flow rate- reducing the nuisance of drift spotting on nearby buildings. Owing to Uni-flow™ design, pressure loss inside the fill is reduced, which helps save on fan power consumption.

Splash-type timber fill also available for high temperature (>55°C) and dirty water applications

- High corrosion resistance
- High tensile strength
- Lower operating weight compared to SS variants
- All steel components are hot-dip galvanised
- Stainless steel hardware and structures available for superior corrosion resistance



FRP CASING

SUPERIOR CORROSION RESISTANCE

IS YOUR GUARANTEE FOR A LONG SERVICE LIFE

Tower casing and water basins are made of FRP – which is one of the most corrosion resistant materials known to man. Moreover, it is lighter compared to stainless steel variants. FRP is best suited when corrosion resistance, compactness and weight savings are a priority.

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- Chemically inert polypropylene plastic nozzles
- Designed and tested for uniform water distribution
- Nozzles can be inspected and replaced even during operation
- FRP distribution basins are corrosion-resistant

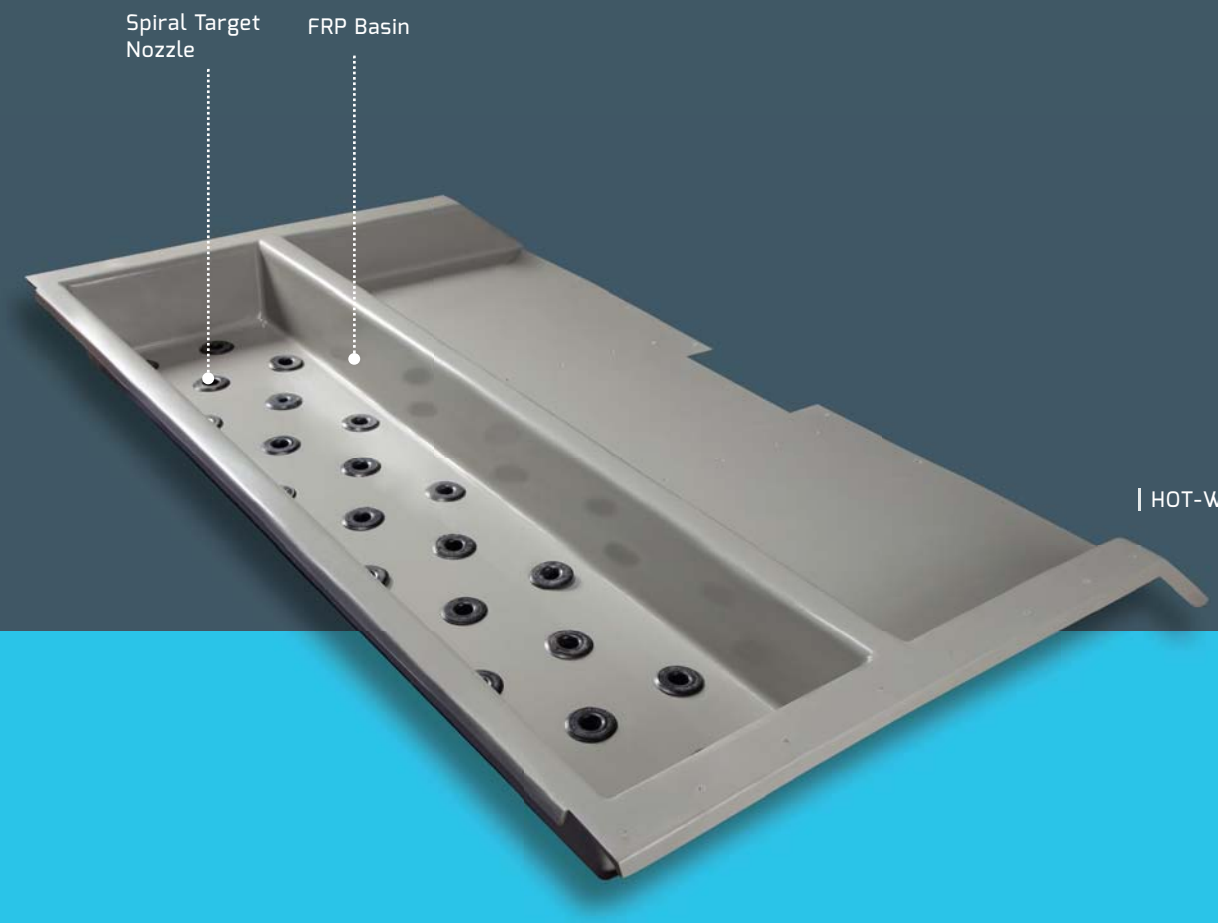
SPIRAL TARGET NOZZLE

UNIFORM WATER DISTRIBUTION

ENSURES UNIFORM COOLING THROUGHOUT THE FILL AREA

An FRP splash box receives warm water through external piping (not included with cooling tower) and keeps water from spilling. Target nozzles then help distribute water throughout the fill sheets uniformly. The nozzles, made of inert polypropylene plastic, are easy to remove and replace in case of design changes.

Single piece FRP cold water basins reduce operating weight, simplify cleaning and ensure proper outflow. Water settles into a depressed area from



HOT-WATER BASIN

where it can be carried via suction piping. Alternatively, field-cut bottom outlets are also available for gravity flow applications.

Target nozzles help distribute water uniformly over the fill area, for maximum heat transfer

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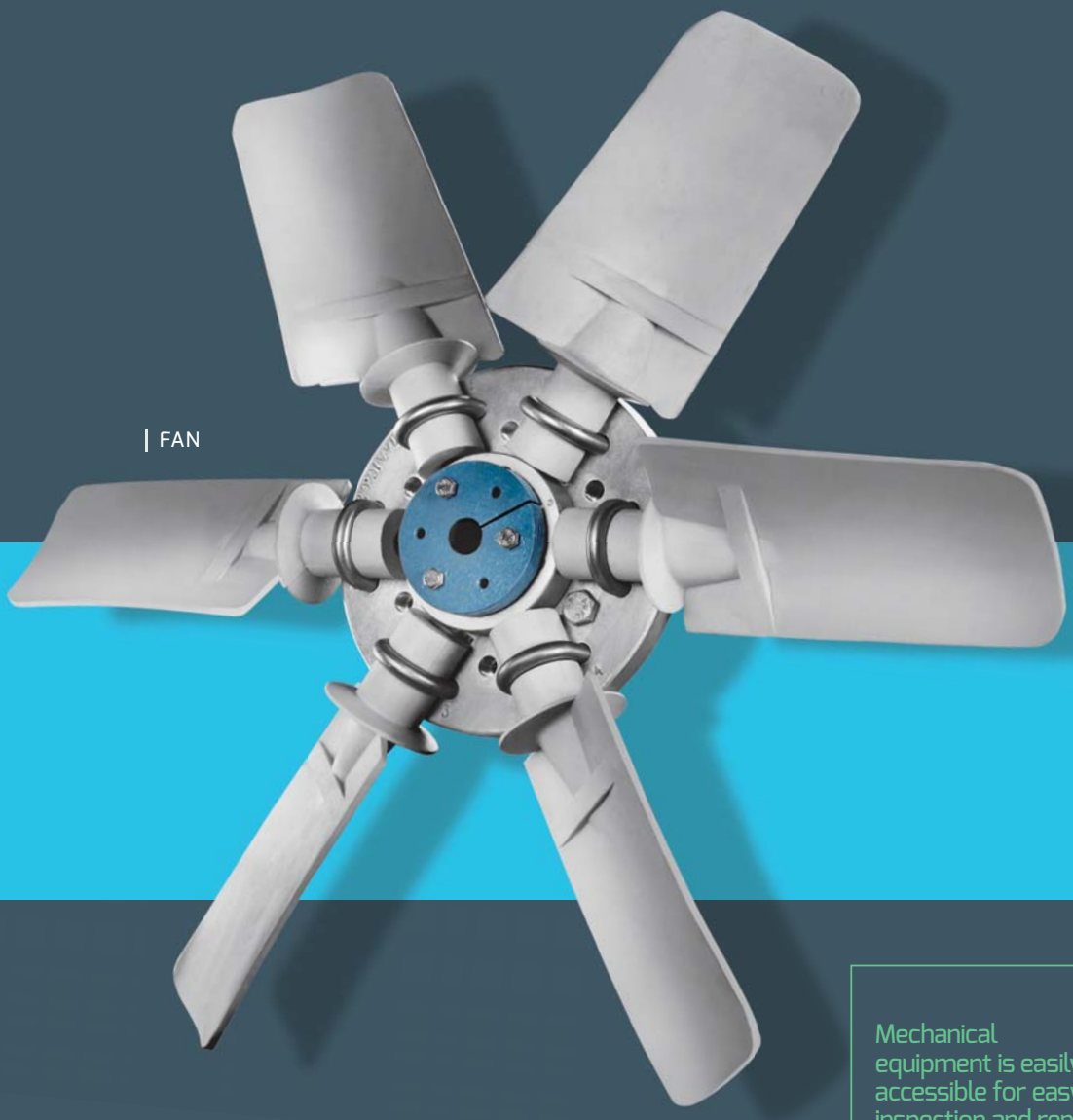
| FAN

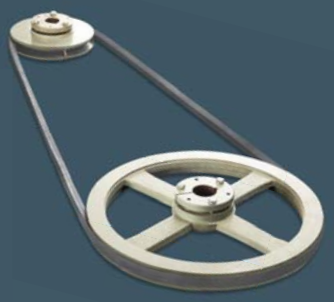


Mechanical equipment is easily accessible for easy inspection and repair

REMOTE OIL-CUP FOR BEARING HOUSING

- Light weight aerofoil design fans
- Adjustable fan pitch gives you more control over fan power consumption
- Bearings are lubricated by remote oil cup mounted on the front of the cooling tower
- Fan-guard is easily detachable for inspection and repair
- Fans used in the AQ series vary in diameter from 610mm (24") to 1676mm (66")

BEARING HOUSING



V-BELT

RUGGED, TIME-TESTED DRIVE TRAIN

HELPS ENSURE HIGH ENERGY EFFICIENCY

Paharpur provides a completely optimised and integrated system of mechanical components which keeps you on top of your energy efficiency needs while also maintaining reliable performance.

Made of rugged, time-tested materials, the V-belts, bearing housings and fan blades all perform seamlessly and are easily accessible for inspection or maintenance.

Fan blades have aerofoil design and adjustable pitch – which allows for optimum utilisation of rated fan power. Fan blades of small diameter are made of GRP and those of larger diameter are made from cast aluminum. The motor is enclosed in a structure outside the tower which provides easy access for inspection and repair.

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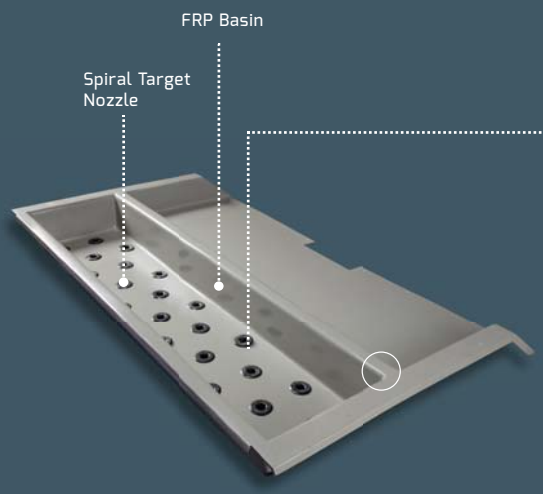
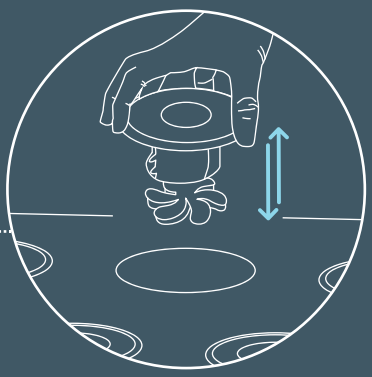
Crossflow towers can be designed for online inspection and maintenance. In Paharpur's AQ series, the entire fill can be inspected for clogging and misalignment from the outside.

ONLINE MAINTENANCE
IN CROSSFLOW TOWERS DRASTICALLY REDUCES DOWNTIME

AQ-3800 is a package tower and allows for easy handling with a forklift, its low profile simplifies placement and reduces need for enclosures.

Reducing your downtime is Paharpur's priority; our cooling towers are designed for maximum online maintenance. In crossflow towers, the fill, motor and mechanical equipment are easily accessible for inspection and repair. Easy access allows you to locate damage and decay in its early stages and thereby





NOZZLES CAN BE REMOVED AND REPLACED EVEN DURING OPERATION

ONLINE MAINTENANCE IN SERIES AQ-3800

avoid long durations of downtime. Online inspection of fill condition is possible only in crossflow cooling towers. This is made even simpler in the AQ Series where the fill can be completely inspected from the back-side of the tower.

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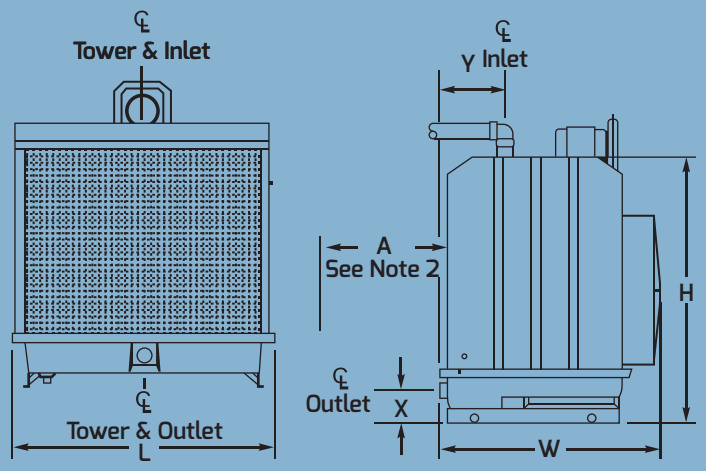
ENGINEERING DATA

MODELS	X (mm)	Y (mm)
3810-3842	241	475
3851-3872	292	651



TOWER MODEL	FLOW (1) (LPM)			DIMENSIONS (mm)					WEIGHT (kg)		MOTOR (3)
	NOMINAL	Min.	Max.	LENGTH L	WIDTH W	HEIGHT H	A (2)	FAN DIA (mm)	SHIPPING	OPERATING	kW
Model nos. 3810-3842 are shipped factory-assembled											
3810	151	50	408	953	1581	1324	914	610	179	310	0.37
3816	227	69	851	1295	1581	1346	914	610	195	451	0.55
3817	302	69	851	1295	1581	1346	914	610	195	451	0.75
3831	453	69	851	1295	1581	1964	1219	914	225	481	1.1
3832	604	69	851	1295	1581	1964	1219	914	225	481	1.5
3841	755	106	1324	1905	1581	1964	1524	1067	288	687	1.5
3842	906	106	1324	1905	1581	1964	1524	1067	288	687	2.2
Model Nos. 3851-3872 are shipped knocked-down											
3851	1133	209	2365	1905	2030	2403	1829	1219	454	1256	1.5
3852	1284	209	2365	1905	2030	2403	1829	1219	454	1256	2.2
3853	1435	209	2365	1905	2030	2403	1829	1219	454	1256	3.7
3861	1661	284	3217	2515	2035	2403	2134	1372	581	1669	3.7
3862	1888	284	3217	2515	2035	2403	2134	1372	581	1669	5.5
3870	2265	360	3406	3124	2035	2403	2743	1524	634	1899	5.5
3871	2416	360	3406	3124	2045	2615	2743	1676	689	2064	5.5
3872	2463	360	3406	3124	2045	2615	2743	1676	689	2064	7.5

Table Notes

1. Nominal flow is based on 36.4°C HW, 32.2°C CW and 28.3°C WB. Minimum and maximum flows are based on hydraulic limits.
2. Minimum clearance for adequate air supply. Consult Paharpur if this clearance is impractical.
3. Standard motors are suitable for 415V/3ph/50 Hz electric supply.

Application

You can use the Series AQ-3800 towers in normal applications requiring cold water for the dissipation of heat. Some common applications include:

- Condenser water service for air conditioning and refrigeration systems
- Jacket water cooling for engines and air compressors
- Chemical and industrial processes
- Batch cooling
- Welder cooling
- Plastic industry processes
- Dairy, citrus and other food industryprocessing where barometric condensers are not in use

The table below will help you determine the heat load — and therefore, the cooling tower capacity you'll need for your duty. If you don't find your application below, or if you need more specific help, contact your Paharpur sales engineer.

Typical Equipment Heat Loads

Type of Equipment	Btu	USGPM	Cooling Range (°F)
Air Conditioning or Refrigeration	**per Ton**	**per Ton**	
Electric motor driven compressor	250/min.	3-4	7.5-10
Steam turbine driven compressor	500+/min.	2-3	20-30
Absorption machine	500+/min.	3-4	15-20
Diesel Engine Jacket Water & Lube Oil	**per BHP**	**per BHP**	
Four-cycle, supercharged	2600/h	.26	20
Four-cycle, non-supercharged	3000/h	.30	20
Natural Gas Engine Jacket Water & Lube Oil	**per BHP**	**per BHP**	
Four-cycle engine	4500/h	.45	20
Two-cycle engine	4000/h	.40	20
Electric Motor Driven Air Compressors	**per BHP**	**per BHP**	
Reciprocating & screw type (200 HP & less)	2800/h	.28	20
Centrifugal (250 HP & above)	2800/h	.28	20
	per CFM	**per CFM**	
Reciprocating & screw type (200 HP & less)	622/h	.065	20
Centrifugal (250 HP & above)	560/h	.055	20
	per oz. Capacity		
Plastic Injection Machines	.125/min.	1.5	10
Hydraulic Oil Cooling	2545/hr./BHP	.51/BHP	10
Welding Tip Cooling	84/min.(avg.)	1.0	10

When possible, determine actual heat load and water quality to be circulated, and apply in the following formula;

$$\text{Cooling Range} = \frac{\text{Heat Load (Btu/min.)}}{\text{US GPM x 8.33}}$$

Where : 8.33 = Pounds per U.S. gallon of water
Cooling Range = Difference between hot water entering tower and cold water leaving tower (°F)

Please use standard conversion factors if metric units are required.

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SUGGESTED SPECIFICATIONS

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BASE

Furnish and install an induced-draft, crossflow, factory-assembled, fibreglass cooling tower of ____ cell(s), as shown on plans. Tower shall be similar and equal in all respects to Paharpur Series AQ3800, Model _____.

PERFORMANCE

Tower shall cool _____ LPM of water from ____°C to ____°C at a design entering air wet-bulb temperature of ____°C.

HOT WATER DISTRIBUTION SYSTEM

An open basin above the fill bank shall receive hot water piped to each cell of the tower. This basin shall be an integral portion of the top section of the tower, precluding the need for installation and sealing. Water shall enter the basin through a removable wave-suppressor splash box. The basin shall be no less than 165 mm deep to provide adequate freeboard against overflow and splash-out. Removable and replaceable polypropylene nozzles installed in the floor of the basin shall provide full coverage of the fill by gravity flow. Nozzles must all have the same orifice size and be spaced symmetrically in both longitudinal and transverse directions. Removable fibreglass covers for the distribution basin are required.

CONSTRUCTION

Structural components of the tower, including the cold water basin, framework, casing, hot water basin and fan cylinder shall be fabricated of fibreglass reinforced polyester, manufactured by the spray lay-up method. Steel components, including the mechanical equipment support members, shall be subjected to factory welding be hot dip galvanised after completion of fabrication. Cold galvanising is not acceptable.

MOTOR

Motor(s) shall be _____ HP, totally enclosed, specially insulated for cooling tower duty. Speed and electrical characteristics shall be 1500 (1500/750) RPM, single-winding, 3-phase, 50Hz, 415 V.

MECHANICAL EQUIPMENT

Fan(s) shall have adjustable pitch aerofoil blades and shall be driven through V-belt(s) with a minimum service factor of 1.50 based on full motor HP. The fan and fan pulley will be mounted on an oil-lubricated bearing housing with stainless steel shaft. An oil reservoir cup with spring loaded cap with be mounted on the front of the tower to supply oil to the bearing housing.

FILL, LOUVRES & DRIFT ELIMINATORS

Fill shall be film-type, vacuum formed PVC, with louvres and drift eliminators formed as part of each fill sheet. Fill shall be suspended from hot-dipped galvanised structural tubing supported from the upper tower structure 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. Guaranteed drift losses shall not exceed 0.005% of the design water flow rate.

COLD WATER BASIN & ACCESSORIES

The cold water basin shall be a single piece, joined to the tower structure at the factory. Suction connection shall include protective screen and anti-cavitation device. A float-operated, mechanical make-up valve shall be included. The overflow stand pipe shall serve as a flush out drain when unscrewed from its fitting.

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100% SYNCHRONISED.

USE ONLY GENUINE PAHARPUR SPARE PARTS 100%

PAHARPUR

'The whole is greater than the sum of it's parts'. All components of a Paharpur cooling tower work in complete synchronisation. Paharpur manufactures all its parts in-house and they are designed and customised for synchronised perfomance. Only original Paharpur parts provide the reliable thermal performance you expect from our products.

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