“HOW GREEN , COOL & ENERGY EFFICIENT IS YOUR COOLING SYSTEM?”

ARMEC GROUP

ARMEC®

ESTABLISHED IN 1990

An ISO 9001 – 2008 Company

Registered with NSIC

Installation Base of over 7265+

across the globe.

INTELLECTUAL PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

सत्यमेव जयते

भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE
पेटेंट प्रमाणपत्र
PATENT CERTIFICATE
(Rule 74 Of The Patents Rules)

क्रमांक : 022107480
SL No :

पेटेंट सं. / Patent No.	:	330946
आवेदन सं. / Application No.	:	889/MUM/2008
फाइल करने की तारीख / Date of Filing	:	21/05/2008
पेटेंटी / Patentee	:	1.HARANI BHAGWANJI DEVJI 2.HARANI SHAILESH BHAGWAN

प्रमाणित किया जाता है कि पेटेंटी को उपरोक्त आवेदन में यथाप्रकटित ZERO DRIFT SYSTEM FANLESS FILL LESS SPRAY TYPE COOLING TOWERS नामक आविष्कार के लिए, पेटेंट अधिनियम, १९७० के उपबंधों के अनुसार आज तारीख 21st day of May 2008 से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled ZERO DRIFT SYSTEM FANLESS FILL LESS SPRAY TYPE COOLING TOWERS as disclosed in the above mentioned application for the term of 20 years from the 21st day of May 2008 in accordance with the provisions of the Patents Act,1970.

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GEOGRAPHICAL INDICATIONS

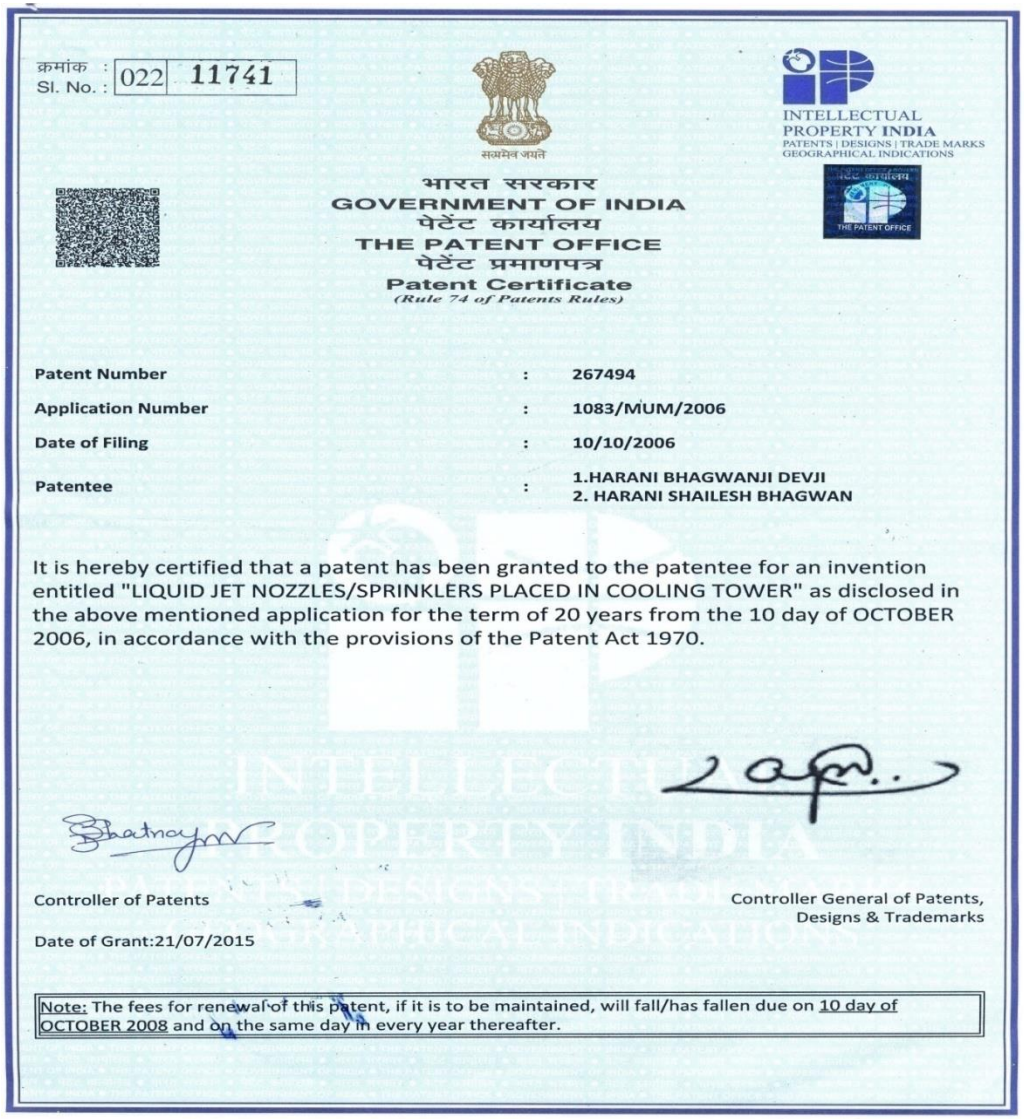
THE PATENT OFFICE GOVT. OF INDIA

अनुदान की तारीख : 31/01/2020
Date of Grant :

पेटेंट नियंत्रक
Controller of Patent

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, **21st day of May 2010**को और उसके पश्चात प्रत्येक वर्ष मे उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on **21st day of May 2010** and on the same day in every year thereafter.

Patent Certificate- ZERO DRIFT SYSTEM FANLESS FILL LESS SPRAY TYPE COOLING TOWER



क्रमांक : 022 11741
Sl. No. :

सत्यमेव जयते

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THE PATENT OFFICE
पेटेंट प्रमाणपत्र
Patent Certificate
(Rule 74 of Patents Rules)

Patent Number	:	**267494**
Application Number	:	**1083/MUM/2006**
Date of Filing	:	**10/10/2006**
Patentee	:	**1.HARANI BHAGWANJI DEVJI** **2. HARANI SHAILESH BHAGWAN**

It is hereby certified that a patent has been granted to the patentee for an invention entitled "LIQUID JET NOZZLES/SPRINKLERS PLACED IN COOLING TOWER" as disclosed in the above mentioned application for the term of 20 years from the 10 day of OCTOBER 2006, in accordance with the provisions of the Patent Act 1970.

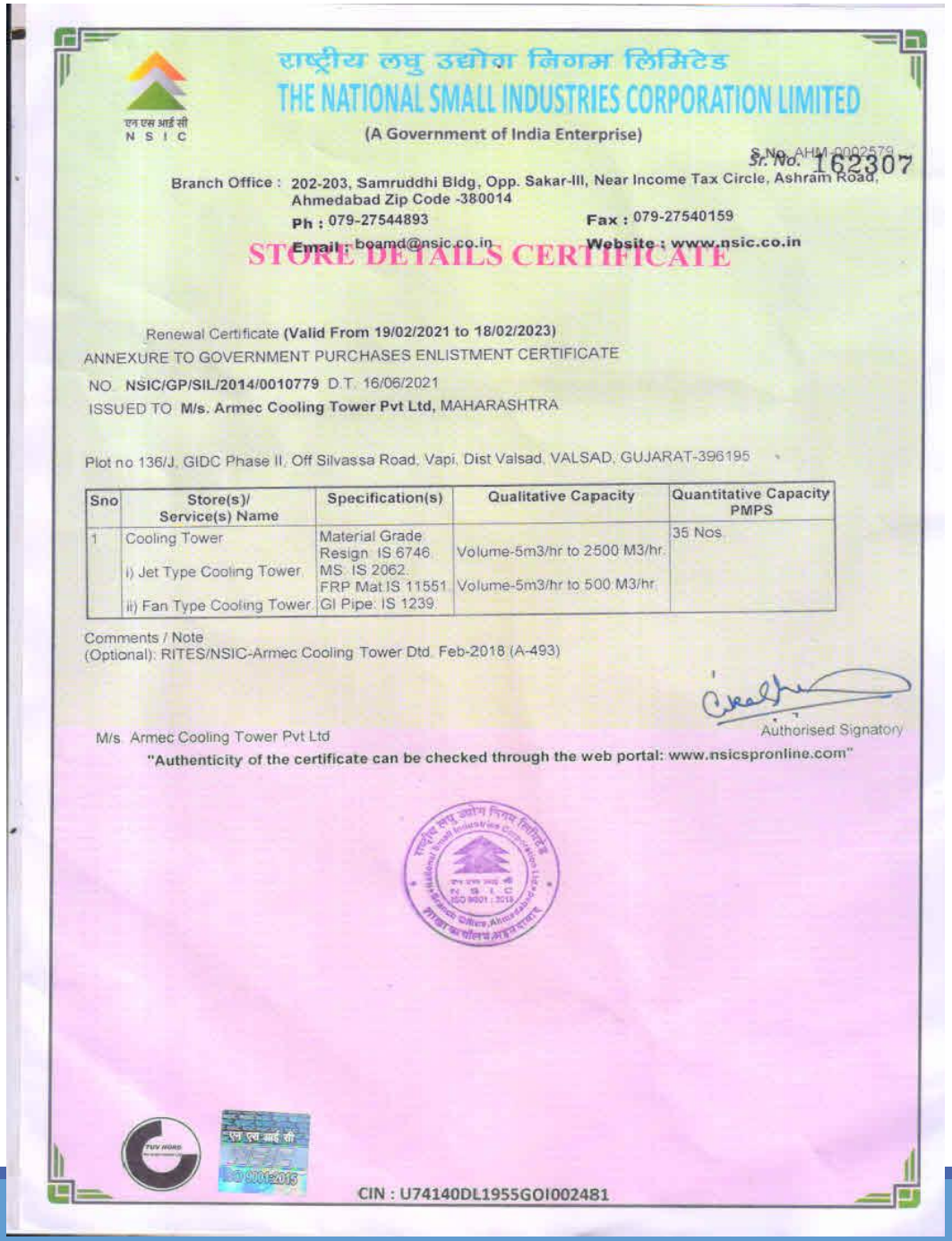
Controller of Patents

Controller General of Patents,
Designs & Trademarks

Date of Grant:21/07/2015

Note: The fees for renewal of this patent, if it is to be maintained, will fall/has fallen due on 10 day of OCTOBER 2008 and on the same day in every year thereafter.

Patent Certificate- JET NOZZLES



राष्ट्रीय लघु उद्योग निगम लिमिटेड
THE NATIONAL SMALL INDUSTRIES CORPORATION LIMITED
(A Government of India Enterprise)

Sr. No. 162307

Branch Office : 202-203, Samruddhi Bldg, Opp. Sakar-III, Near Income Tax Circle, Ashram Road, Ahmedabad Zip Code -380014
Ph : 079-27544893 Fax : 079-27540159
Email : boamd@nsic.co.in Website : www.nsic.co.in

STORE DETAILS CERTIFICATE

Renewal Certificate **(Valid From 19/02/2021 to 18/02/2023)**
ANNEXURE TO GOVERNMENT PURCHASES ENLISTMENT CERTIFICATE
NO. **NSIC/GP/SIL/2014/0010779** D.T. 16/06/2021
ISSUED TO **M/s. Armec Cooling Tower Pvt Ltd,** MAHARASHTRA

Plot no 136/J, GIDC Phase II, Off Silvassa Road, Vapi, Dist Valsad, VALSAD, GUJARAT-396195

Sno	Store(s)/ Service(s) Name	Specification(s)	Qualitative Capacity	Quantitative Capacity PMPS
1	Cooling Tower i) Jet Type Cooling Tower ii) Fan Type Cooling Tower	Material Grade Resign IS 6746 MS IS 2062 FRP Mat IS 11551 GI Pipe IS 1239	 Volume-5m3/hr to 2500 M3/hr Volume-5m3/hr to 500 M3/hr	35 Nos

Comments / Note
(Optional): RITES/NSIC-Armec Cooling Tower Dtd. Feb-2018 (A-493)

Authorised Signatory

M/s. Armec Cooling Tower Pvt Ltd

"Authenticity of the certificate can be checked through the web portal: www.nsicspronline.com"

CIN : U74140DL1955GOI002481

NSIC Certificate

ARMEC ®JET TOWERS ®

Mission

- Optimum cooling
- Trouble free operation
- Least operating cost
- Savings on energy bills
- Creating greener environment

ARMEC® JET TOWERS®

- **INVENTOR & PATENT OWNER OF JET COOLING TOWERS “FAN-LESS & FILL-LESS”**
- **ENERGY SAVING**
- **COMPACT** DESIGN
- **MODULAR CONSTRUCTION**
- **EXPORT FRIENDLY**
- **EASY TO SHIFT & RE-ERECT**
- **ASSETS MANAGEMENT SYSTEM : Process Water**

GREAT ACHIEVEMENT IN VSSC-ISRO

ARMEC Cooling tower was formally inaugurated at VSSC-ISRO by Shri S. Somanath, Chairman, ISRO/ Secretary, Department of Space

1500TR ARMEC Jet cooling tower technology at their Ammonium Perchlorate Experimental Plant (APEP) which manufactures fuel Oxidiser for all units of ISRO

- Self defeating.
- Not a constructive and creative way to solve problem.
- Should not be used by future generations.

Cooling Tower As A Concept

Low grade heat from plant

↓ ↓ ↓ ↓

Heat recovery/storage/use facility

No need of cooling tower

What Must Happen In Future

Use

Yours/Ours

Resources

Wisely

Till such time

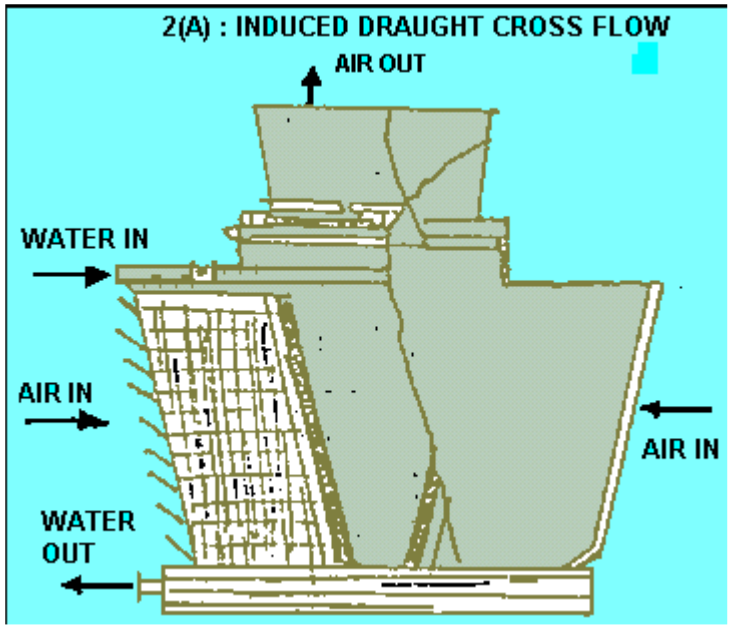
YOU MAY HAVE WOODEN COOLING TOWER

YOU MAY HAVE FRP COOLING TOWER

YOU MAY HAVE RCC COOLING TOWER

Working of Cooling Tower

COMPONENTS IN A CT



Water Distribution

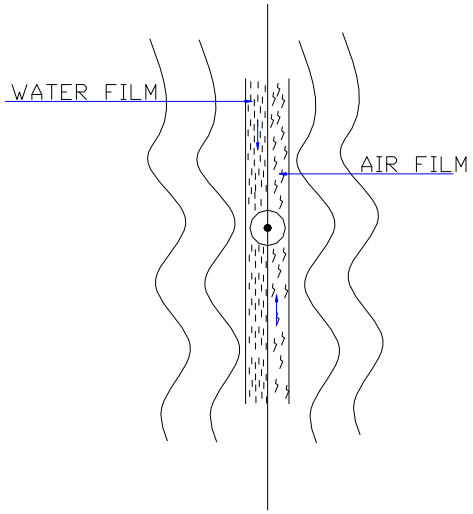
- SPRAY NOZZLES.
- DISTRIBUTION VALVES.
- 0.2 Kg / Cm2 to 1.0 Kg / Cm2

Air

- DIRECT DRIVE
- BELT DRIVE
- GEAR DRIVE
- NO LARGE BLOWERS

Principal of Operation

FILM BASED EVAPORATION



EVAPORATION COOLS WATER

ARE THESE SYSTEMS GREEN? COOL? ENERGY EFFICIENT?

CROSS FLOW WOODEN COOLING TOWER

MERITS / PLUS POINTS

OLDEST PROVEN DESIGN : VERY POPULAR FOR MANY YEARS.

LOW APPROACH POSSIBLE.

LARGE CAPACITY AVAILABLE.

SPACE LESS THAN ANY NATURAL DRAUGHT COOLING SYSTEM.

PROBABLE DEMERITS

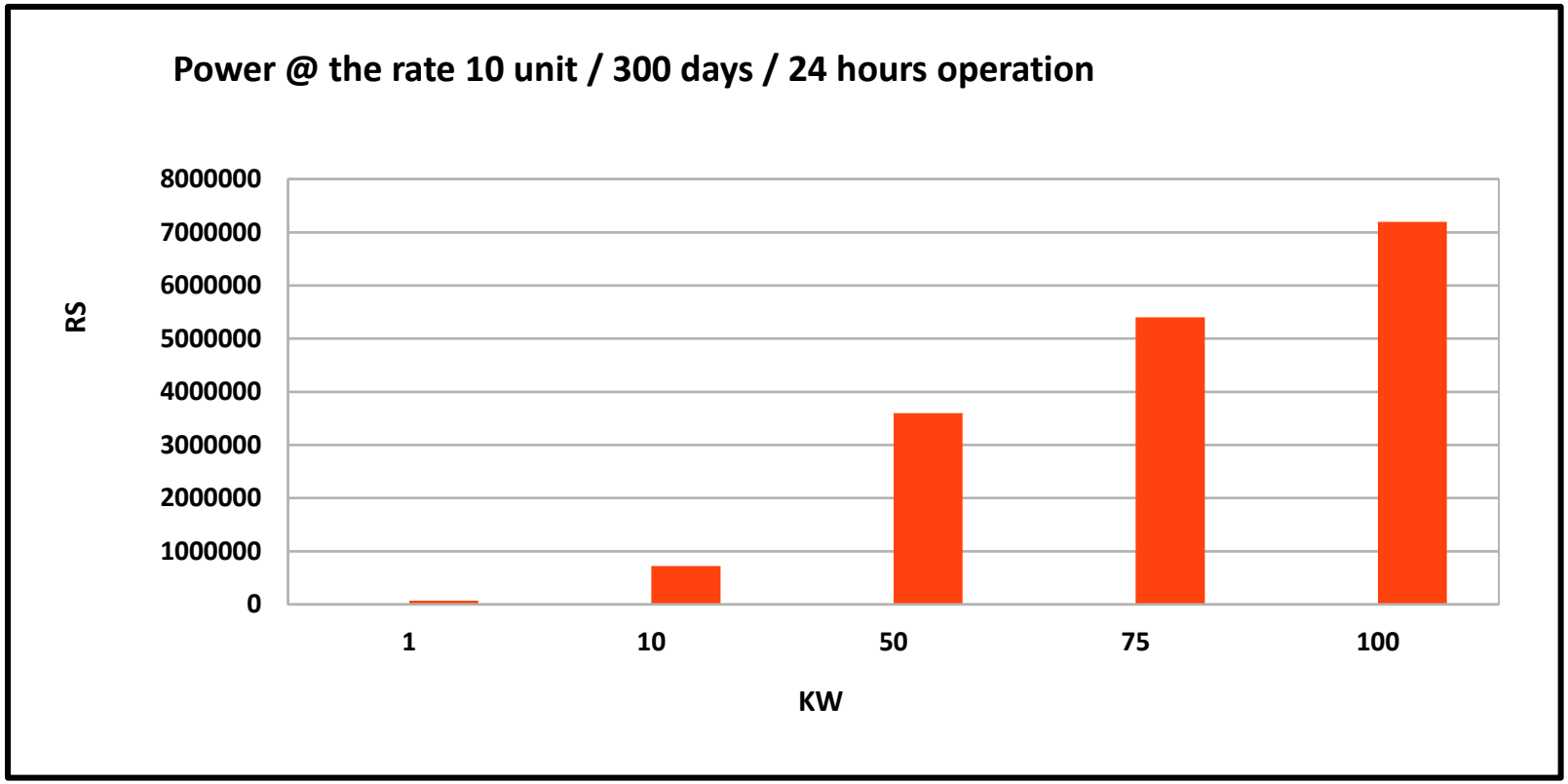
QUALITY WOOD EASILY NOT AVAILABLE

NO EFFECTIVE SUPPORT FROM OEMS

OEMS PROMOTING RCC/CONCRETE COOLING TOWER

RUNNING COOLING TOWER CAN COLLAPSE DUE TO AGEING – MAY BE FATAL

CONTINUOUS POWER HUNGRY



POWER CONSUMPTION

NOISE

VIBRATION

ALIGNMENT PROBLEMS

BALL BEARING PROBLEMS

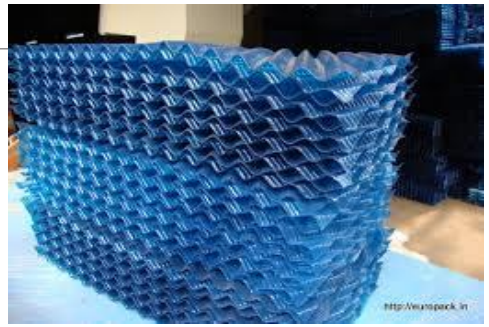
STRUCTURAL STABILITY PROBLEMS

STAND BY INVENTORY IS MUST

GEARBOX

FAN

FILLS



DRIFT ELIMINATOR

MOTOR

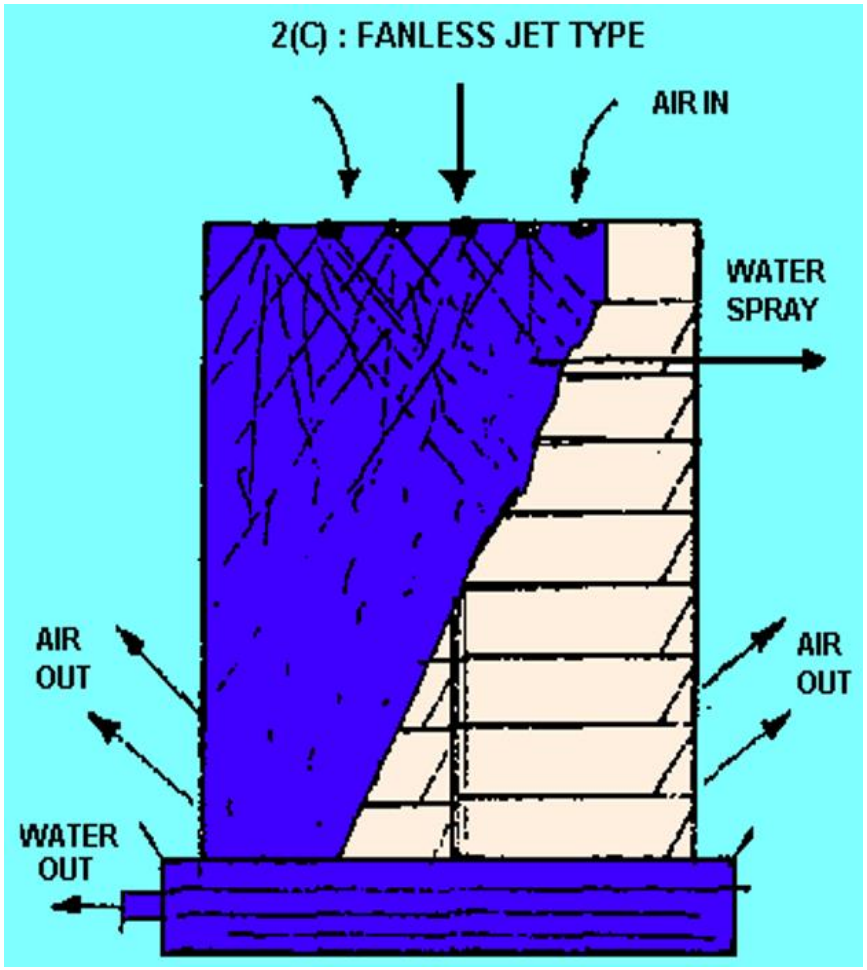
BALL BEARING

YOU MAY HAVE

OR

YOU MAY INSTALL.

JET TOWER



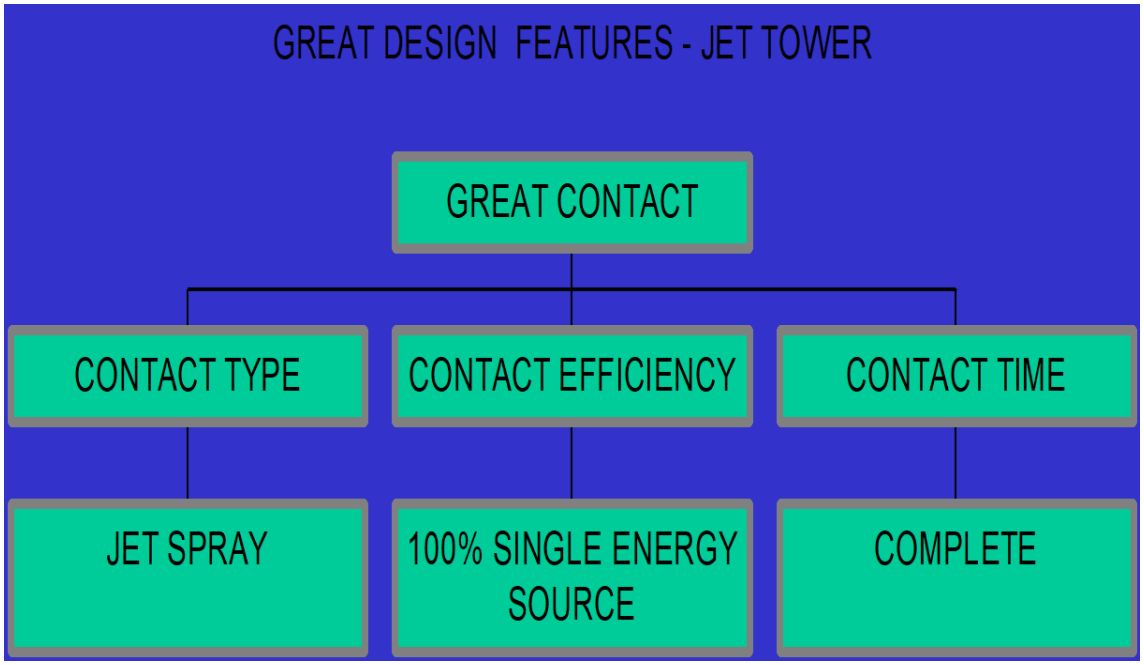
TECHNOLOGY
Jet Cooling Tower

- In Jet tower air current is produced by Jet Effect
- Jet nozzles are placed at the top of the tower
- When water comes out of nozzles, it pushes surrounding air downwards by Jet effect
- This air is drawn out of tower from the bottom, through side eliminators (louvers)

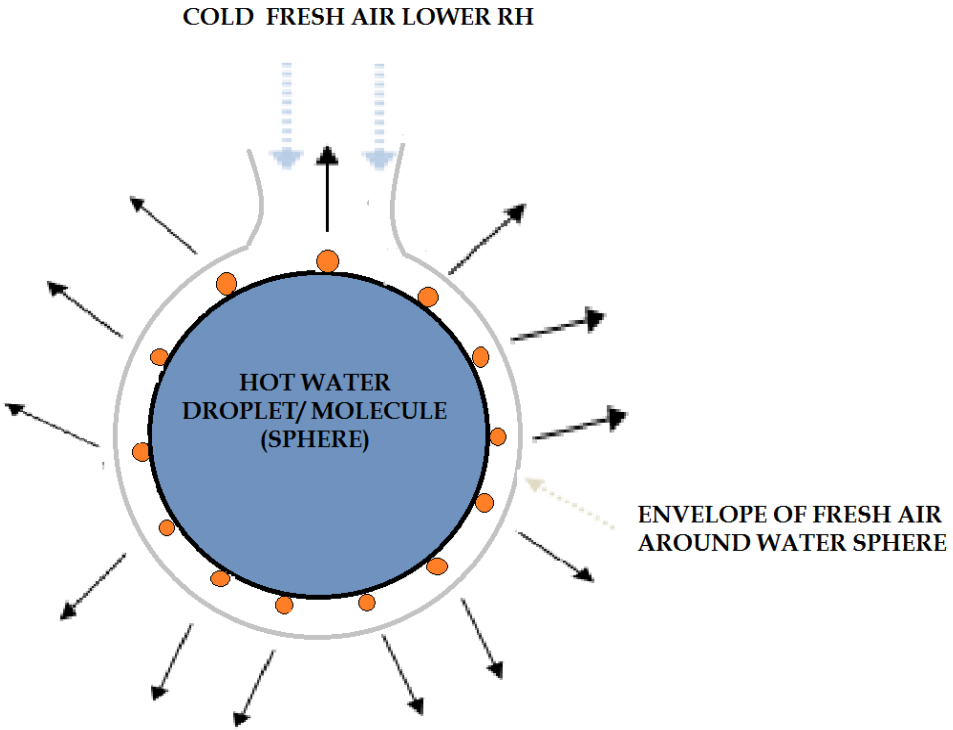
Principle of Operation of Jet Cooling Tower.

- Jet Cooling Towers work on Water Jet principle.
- So when water comes out of Jet nozzles, it pushes the air below it, creating a low pressure zone.
- Hence surrounding air tries to rush in and air current from top to bottom is established.
- When water comes out of nozzles, it pushes surrounding air downwards by Jet effect.
- Exit air is drawn out of tower from the bottom, through side eliminators (louvers).

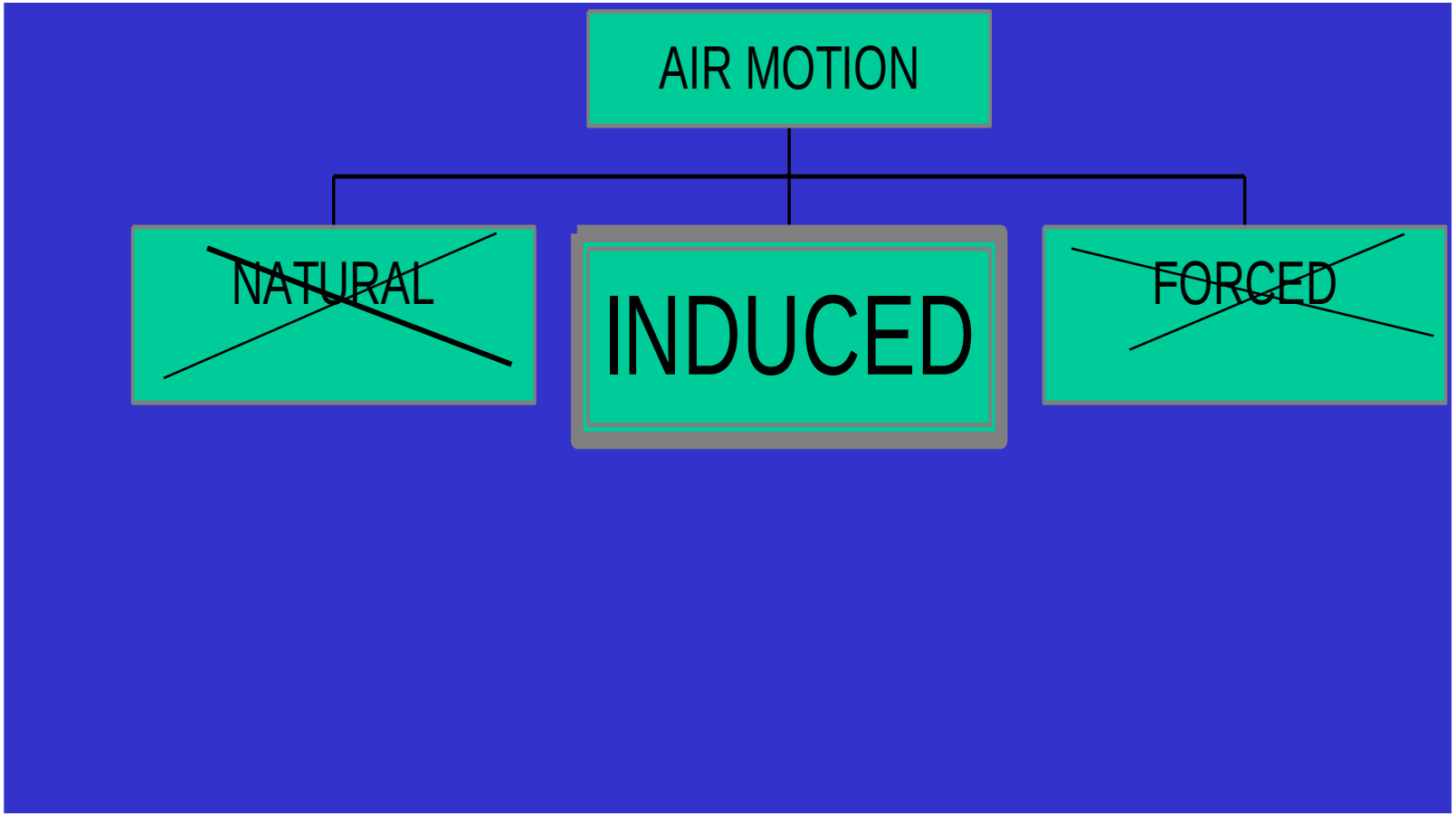
Jet Cooling Tower



MULTIPLE EXIT FOR EVAPORATION



Jet Cooling Tower – Air Motion



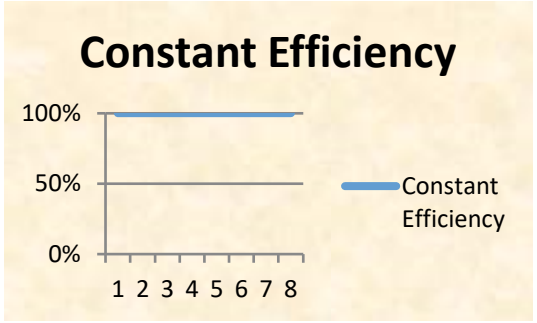
JET COOLING TOWER

The Most User Friendly

Energy Saving

Maintenance Free

Constant Efficiency



- Huge Fan power saving.
- Very few components.
- Very less civil works.
- Modular Constructions.
- Easy to shift & expand

GREEN COOLING TOWER

- Component level maintenance possible.
- No need of Lubricant Oil.
- No electrical power cable.
- No heat generation due to friction .
- No fire hazards.

GREEN COOLING TOWER

SPECIAL DESIGN ASPECTS

- High wet bulb
- High ambient

UNIQUE FEATURES

- Multi application
- Expansion
- Re shifting
- Smaller units

CAPACITY AVAILABLE

- 5 m3/hr to 2500 m3/hr Single cell,
- Higher capacity in multi cell configuration.

Jet Cooling Tower

- No special mechanical device like fan / blower is required for air circulation.
- As water is sprayed, tower becomes spray filled, hence nothing like pack or fills is required.
- Construction is modular so expansion is very easy.
- Single tower can be used for multi-application.
- 100 % fan power is saved.
- Practically zero maintenance.

MERITS - Jet Cooling Tower

- Cooling Tower will never collapse.
- Can handle contaminated water.
- Can tolerate Algae growth.
- Can handle water with dissolve matter .

END USER FRIENDLY-Because

- Hot & Humid Air is discharged from all sides.
- Looks like natural draught tower.
- Space requirement : 15 to 20 % more.
- Clear space around jet tower : 2 to 3m.

Technical Demerits - Jet Cooling Tower

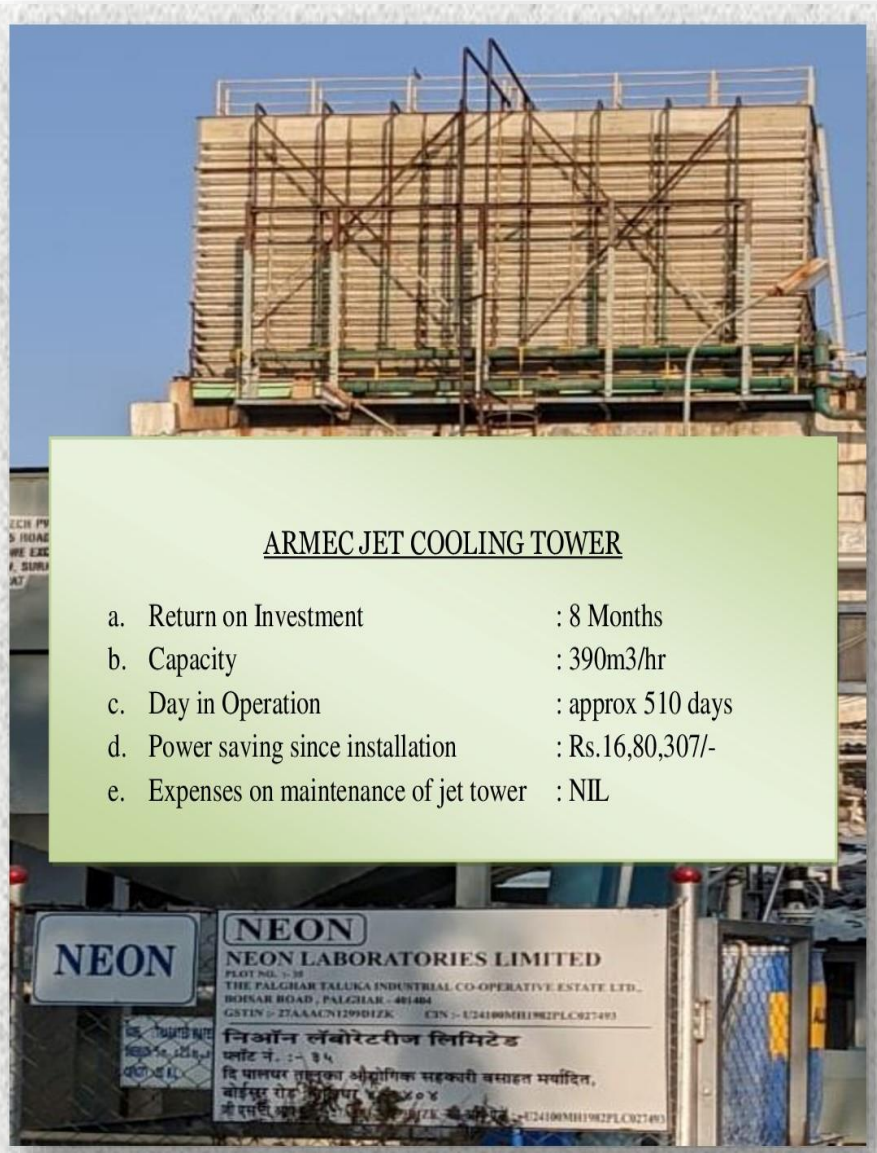
Recently Installed & Partially commissioned–IOCL Kandla- LPG-Import Plant.

Jet Cooling Tower Capacity- 1500m3/hr for LPG IMPORT TERMINAL

ARMEC MOMENT OF PRIDE…Recently Inaugurated At Bharat Petroleum Corporation Limited-Mumbai

INSTALLATION - For HVAC Plant at IT Park with Residential Zone

- **Jet Tower of Capacity 225 TR**
- **Installed in year 2002-03 : replacement of fan type as a Noise Free Tower : complaints from residential area**
- **AC PLANT supplied by Voltas.**

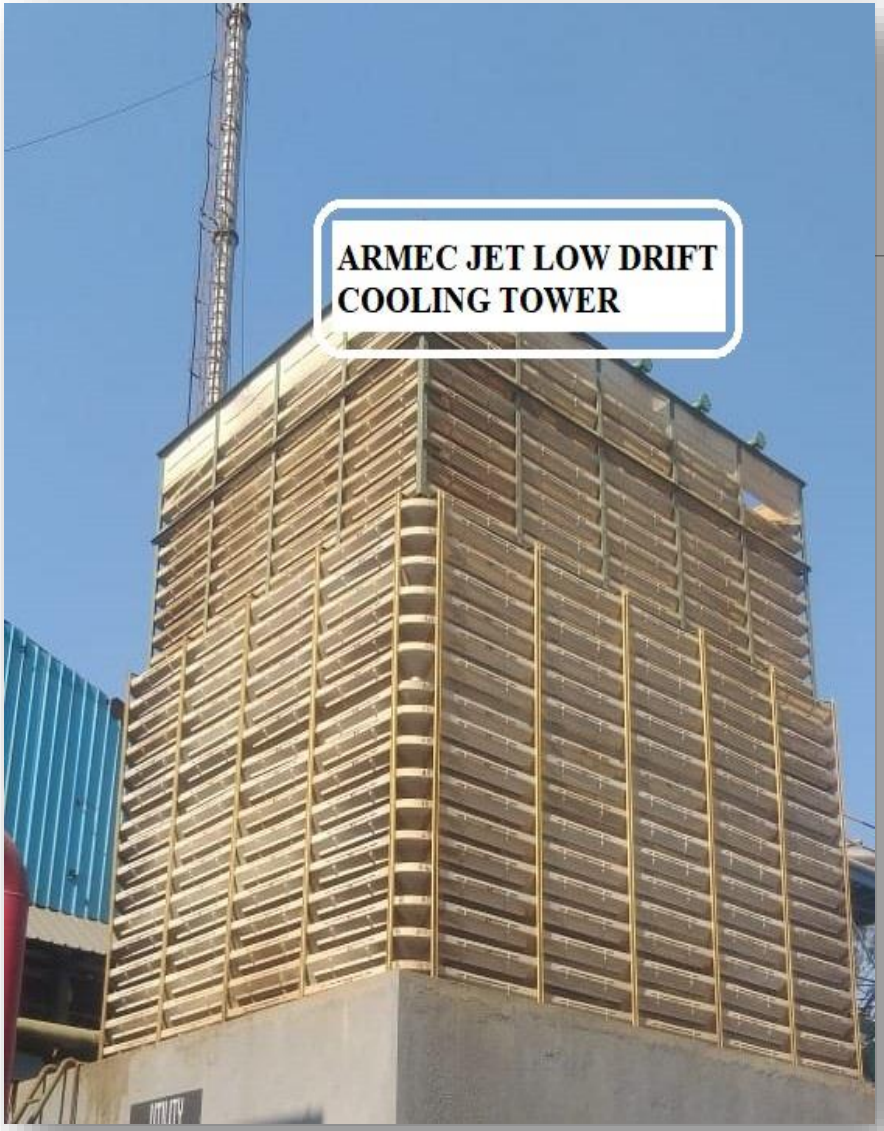


INSTALLATION - Pharmaceutical

- **Jet Tower of Capacity : 390m3/hr in Neon Laboratories Ltd.**
- **Installed in year 2017-18.**
- **Jet cooling tower for 3deg C Approach**

INSTALLATION - PSU – Refinery in Coastal Belt (High wet bulb Area)

- **Requirement: Energy saving & maintenance free**
- **Reason: Quick Payback Period**
- **Solution: One Jet tower of 550 m3/hr capacity was installed**

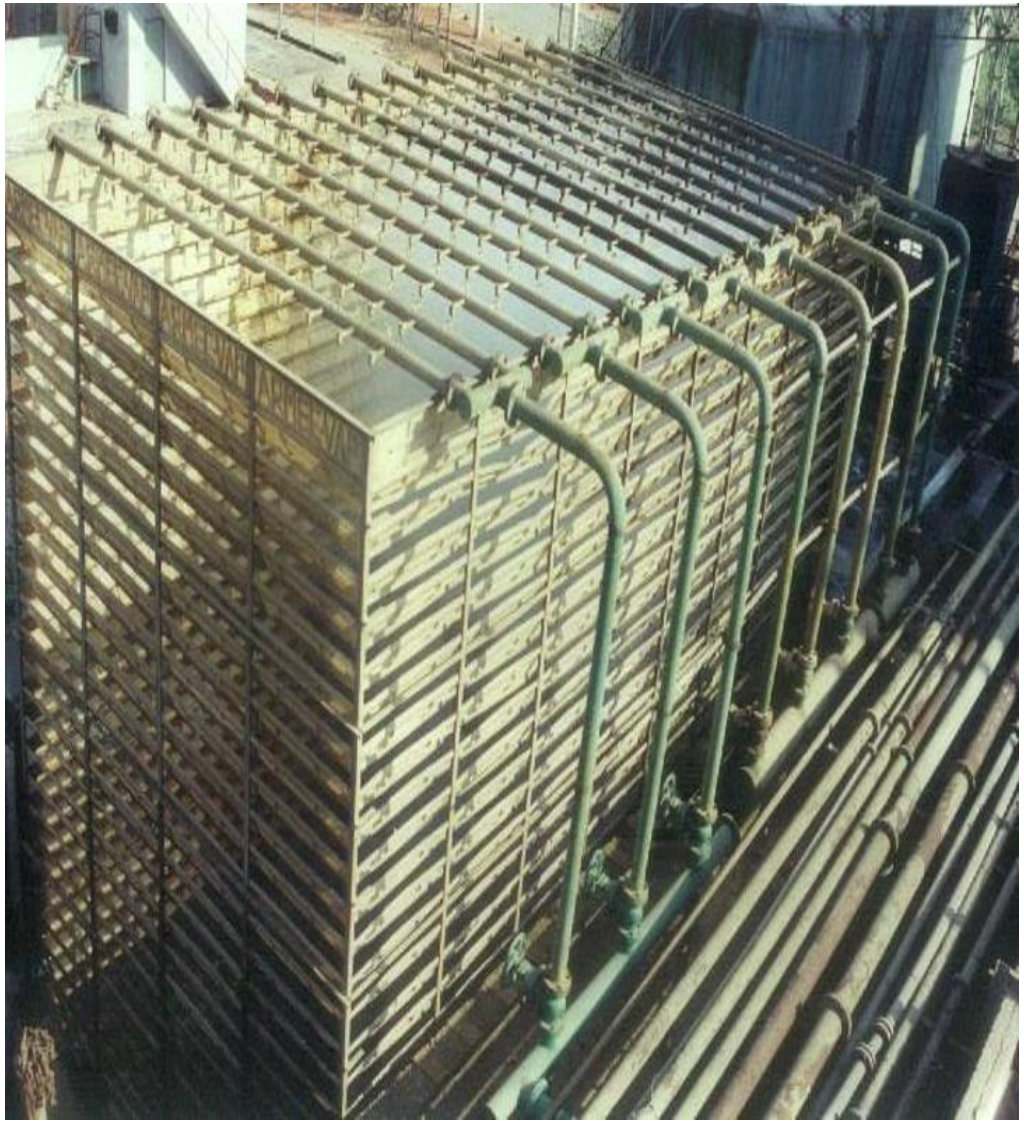


INSTALLATION - Pharmaceutical

- **Jet Tower of Capacity 250m3/hr in Alkem Laboratories Ltd.**
- **Installed in year 2020-21 : Double drift Jet cooling Tower (Very low drift loss - 0.001%)**
- **4 pass drift eliminators to minimize drift loss.**

INSTALLATION - Food Industry

- **Jet tower of capacity 60 CUM / HR**
- **Installed in year 2016-17**
- **Used for Food Industry – Rasgulla cooling line.**
- **4 pass drift eliminators to minimize drift loss.**



INSTALLATION - Chemical Process

- **Single Jet tower for multi machines.**
- **Installed in year 1997-98**

Jet Cooling Tower - Structure

- Jet Cooling Tower is made of non corrosive material using FRP
- Louvers : moulded FRP
- structure : MS sections are lined with FRP
- Nozzles : Nylon 6. Industrial plastic
- Nut Bolts : Glass filled Nylon

INSTALLATION - Detergent Plant

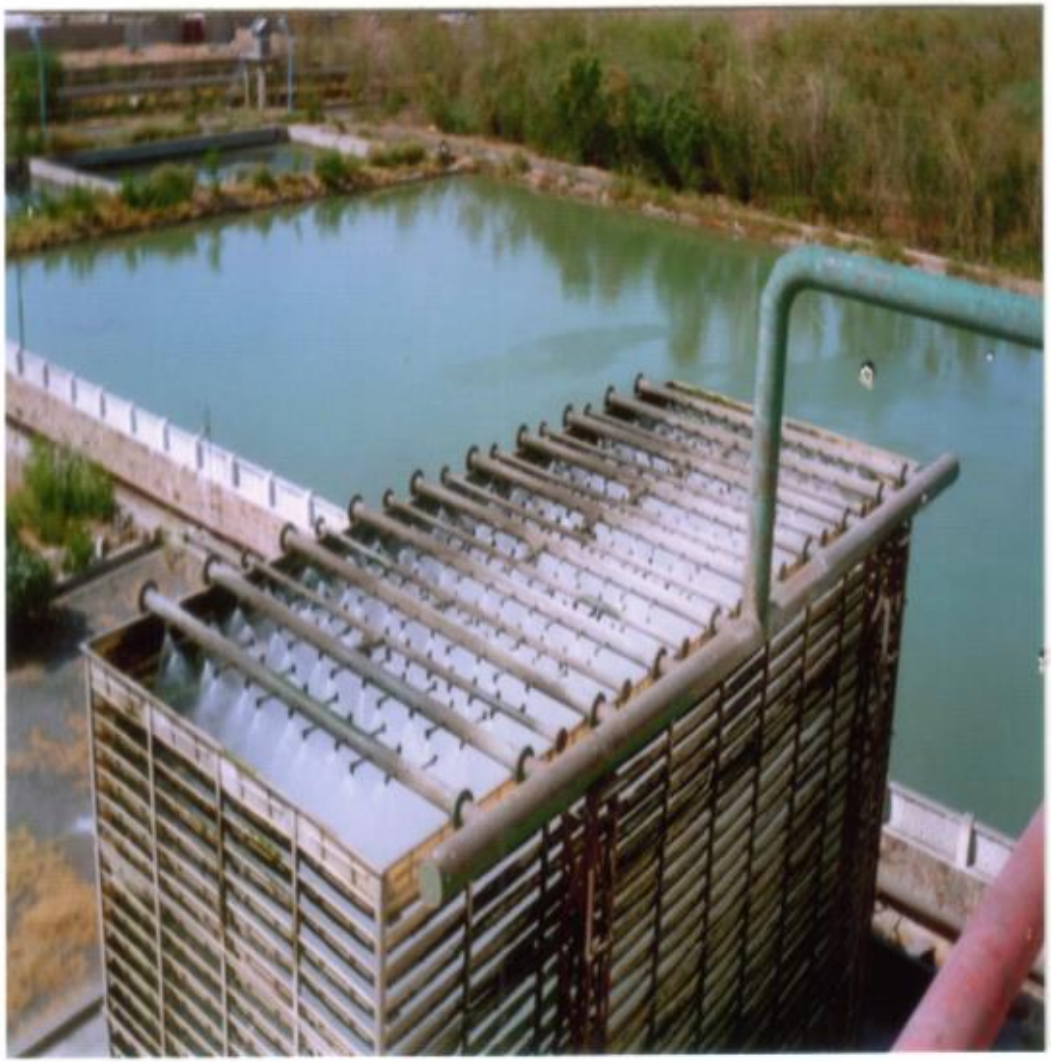
- **Two jet towers, each of capacity 250 CUM / HR**
- **Installed in year 1997-98**
- **Used for detergent powder manufacturing process.**
- **The water carries soap particles**

INSTALLATION - For DG Set

- **Single Jet tower of capacity 450m3/hr**
- **Installed in year 2006-07**

INSTALLATION – Chemical Process

- **jet tower of capacity 300 CUM / HR**
- **Installed in year 1997-98**
- **Used for Sulfuric Acid manufacturing process.**



DCM SHRIRAM CONSOLIDATED LTD – Kota (Rajasthan).

- **Jet tower capacity : 1000m3/hr x 4 Towers**
- **Application : Urea / Ammonia**
- **INSTALLATION - Fertiliser Plant**

800m3/hr- STEEL INDUSTRY (TMT BARS COOLING)

840M3/HR-Process cooling-Metal industries : ANODE CASTER

INSTALLATION - Steel Plant

- **Jet tower capacity: 1000m3/hr x 5 Towers**
- **Application: STEEL**

INSTALLATION - Power Generation Plant

- **Jet tower capacity: 1250m3/hr x 2 Towers**
- **Application: Power Generation**

INSTALLATION – Process Cooling

- **Jet tower capacity: 120m3/hr**
- **Application: Condensate Cooling**

INSTALLATION - Sugar Mill

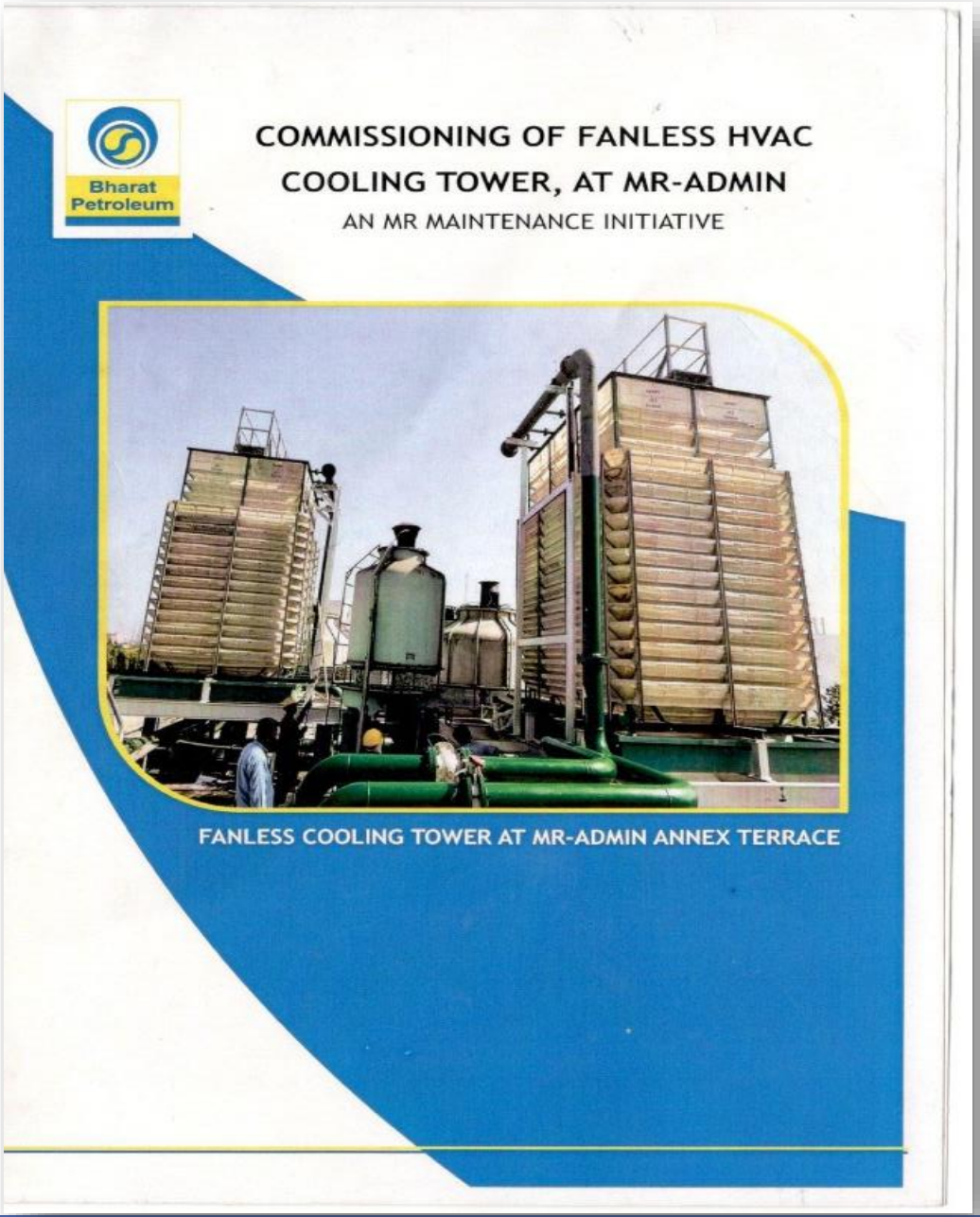
- **Jet tower capacity: 900m3/hr x 2 Towers**
- **Application: Sugar**

Maximum single cell capacity= 3000m3/hr (6000m3/hr installed)

Single location installation=7000m3/hr (2000m3/hr x 2, 1500m3/hr x 2)

MYLAR SUGAR

FRP Staircase for large cooling tower installation & other Industrial structures



Case Study of BPCL-Mumbai

Case Study : Bharat Petroleum Corporation Ltd

Project : Installation of fan-less HVAC cooling towers in MR Admin

Vendor : M/s. Armec Cooling towers Pvt. Ltd (ISP 9001-2008/NSIC)

Cost : Rs. 21,00,853

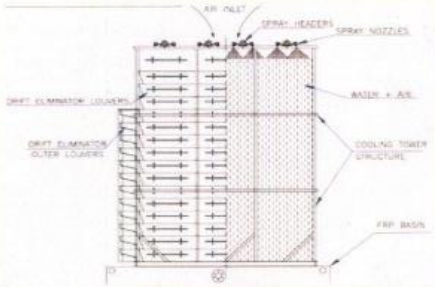
Objective : Installation of energy saving and maintenance free Cooling Towers.

Background :

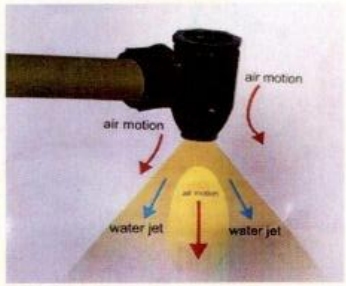
Cooling Towers (CT) are an integral part of HVAC system performing as heat exchangers that use water and air to transfer heat from air-conditioning systems to the outdoor environment. Conventionally induced draft cooling towers are employed for heat exchange which uses fan for induced draft. For the first time in BPCL MR, we have introduced fan-less CT for Admin Annex-North HVAC system. These cooling towers are based on liquid jet technology where air movement is induced with the help of water jets and also called as Jet Cooling Towers.

The hot water from the heat source is circulated to the inlet header of the CT. The inlet header pipes have branches and sub branches covering the internal area of the CT. The non-clog nozzles are connected at the outlets of the sub branch piping. At an inlet pressure of 2 - 2.5 Kg/cm^2 to the CT. The hot water is atomized to a mist state. The nozzles are self-designed to create more pressure thereby converting water into minute atomized particles. From the four sides of the louvers, plenty of fresh air is automatically circulated by the aerodynamic designed FRP Louvers.

The hot water that are in a mist state comes directly into contact with the ambient air and the cooling is achieved mainly by the portion of water that gets converted to vapours, thus caring away the heat through evaporation. Therefore, water gets cooled.



FAN-LESS COOLING TOWER COMPONENTS



JET ACTION THROUGH NOZZLE

Cost Benefit Analysis:

- **Power Savings:**

CT motor for 100 TR rated Cooling Towers: 5.5 kW
Power savings in a year: 5.5 kW X 9 hrs X (365-52) days X 2 CT = 30987 Units
Cost Savings: Power Savings X Unit Rate (Rs. 9/Unit) = Rs. 2,78,883/ Year

- **One Time CostSavings:**

Cost of motors + Push button stations + power & control cables (Rs. 65,000 X 2 nos.) = Rs. 130,000

Salient Features:

APPLICATIONS	FEATURES
Extensively used in HVAC systems	Easy Maintenance: Due to absence of no moving parts/mechanical devices/choking parts like fins etc., no regular maintenance is required.
Captive Power Plants	Power Saving (Eliminates the use of CT fan)
Air compressors, Quenching Oil Cooling	Water Saving: Louvers are specially designed to minimize drift losses.
Process Cooling: a. Jacket and heat exchangers b. Vacuum condensers/ steam jet ejectors	Constant Efficiency: Efficiency of cooling tower remains constant with continuous usage as water to air contact area & contact remains unaffected.

Comparison Table:

Features	Fan - less CT	Conventional Fan Type CT
Fan requirement/gear boxes/bearings	NO	YES
Vibration	NO	YES
Moving Part Wear & tear	NO	YES
Collapse of Fan blade motor assembly	NA	PROBABLE
Fills Ageing/chocking/replacement	NA (NO FILLS)	YES
Power Saving	100%	NO
Higher Delta T Possible	YES	NO
Delta 'T' range (Deg C)	4-20 deg C	4-5 deg C
Spares Required	NEGLIGIBLE	YES
Running Cost	NEGLIGIBLE	VERY HIGH
Maintenance	ZERO	REGULAR
Efficiency	CONSTANT	DECREASE WITH OPERATION
Expansion of CT	POSSIBLE	NOT POSSIBLE

Case Study: Bharat Petroleum Corporation Ltd , Kochi

Energy Saving Jet Type Fanless Cooling Tower at GT-2 Power Plant

Mr BK Datta, Director (Refineries) inaugurated the operation of the Jet type cooling water tower in GT2 area on 22 January in the presence of Mr Prasad K Panicker, ED(KR), Mr P Kumaraswamy, GM(I/C) Project, Mr MN Neelakanton, GM(AE), Mr CK Soman, GM(O) and other executives.

The first of its kind in BPCL, Jet type fan less cooling tower saves considerable electrical energy as it does not have any fans. About 30KW power consumption is saved due to discontinuation of two numbers induced draft fans of the old cooling tower. Power savings is around Rs. 25 lakhs per annum. The entire project cost was Rs. 55 lakhs.

The cooling tower supplied by M/s Armec Cooling Tower (P) Ltd. was installed in GT2 Power plant.

Mr BK Datta with KR officials in front of the cooling tower at GT-2 power plant

Main Highlights of Jet type cooling tower are:

- The fan less cooling tower has no fills and rotating equipments. Hence virtually it is maintenance free.
- Reliability issues due to fan failure, dislocation of distribution header branch pipes, disintegration of fills and it's carry over etc are eliminated.
- Drift losses are reduced due to extended sump.
- Fast installation.

Mr BK Datta inaugurating the Jet type cooling water tower

Mr Neelakanton MN hoisting the safety flag

Kochi Refinery achieves 38 million accident free man-hours

BPCL Kochi Refinery achieved 38 million accident free man-hours equivalent to 3294 days on 6 January 2015. In this regard, Mr Neelakanton MN, General Manager (Advisory Engineering) hoisted the safety flag in a function held at KR on 7 January.

"There shall not be any compromise on Safety," said Mr Neelakanton MN while congratulating all employees on achieving this milestone. Mr Prasad K Panicker, Executive Director (KR) congratulated all employees and stressed the importance of implementing Behaviour Based Safety (BBS) to scale more heights. Sweets were distributed to the employees.

Mr Prasad K Panicker addressing the employees

Case Study - CEAT Ltd

Location	: Ceat Corporate Head Quarters, Mumbai.
Application	: Packaged Air-conditioning units of Voltas make.
Capacity	: 330 TR (Total 26 Unit of 7.5 TR and 10 TR)
Replacement Time	: 2 ½ days.
Conventional C. T.	: Jet Tower
Fan HP	: 7.5 x 2 = 15 HP
Space Required	: 4.9m x 5.0m 4.8m x 4.8m

Case Study – Cummins Diesel

Location	: Cummins Diesel Sales & Services (I) Ltd.	
Application	: Central A. C.(Mcquey Chillers) + D.G.[2 Separate Cooling Towers].	
Capacity	: 225 TR + 750 KVA x 2 Nos	
Replacement Time	: 3 days.	
Conventional C. T.	: Jet Tower	
Fan HP	: 15 + 5 = 20 HP	
Space Required	: 16’ x 12’ and 8’ x 8’	16’x20’(single Tower for both application.)

Case Study - Phillips Carbon Black Ltd

Location	**: Palej, Gujrat**
Application	**: Aux cooling for Power Plant** **: Air Compressor Cooling.**
Capacity	**: 500 m3/hr**
Fan HP	**: 15 X 2 = 30 HP**

FAILURE TO SUCCESS

Why did Turnkey contractor opted for ARMEC Copier	• **Cheap & Price suiting.** • **Reduce project cost mission.**
Post installation	Cooling tower miserably failed, The Supplier did not turn up.
Team ARMEC	Called by User
Team ARMEC	Modified existing failed tower.
Key features	• Jet Venturi design • Improved contact time
Time Period for retrofitting	3 Days

LIFE CYCLE COST ANALYSIS (LCCA)

Factors to be considered

LCCA – DATA

- Application : Power Plant /Process Cooling
- Water Flow Rate : 2500 m3/Hr
- Inlet Temp : 42 / 40 °C
- Outlet Temp : 32 °C
- Wet Bulb Temp : 28 °C
- Fan power consumption :

Jet Type	: 0 KW
RCC Type	: 132 KW
Wooden Type	: 110 KW
PVC FRP Type	: 143 KW

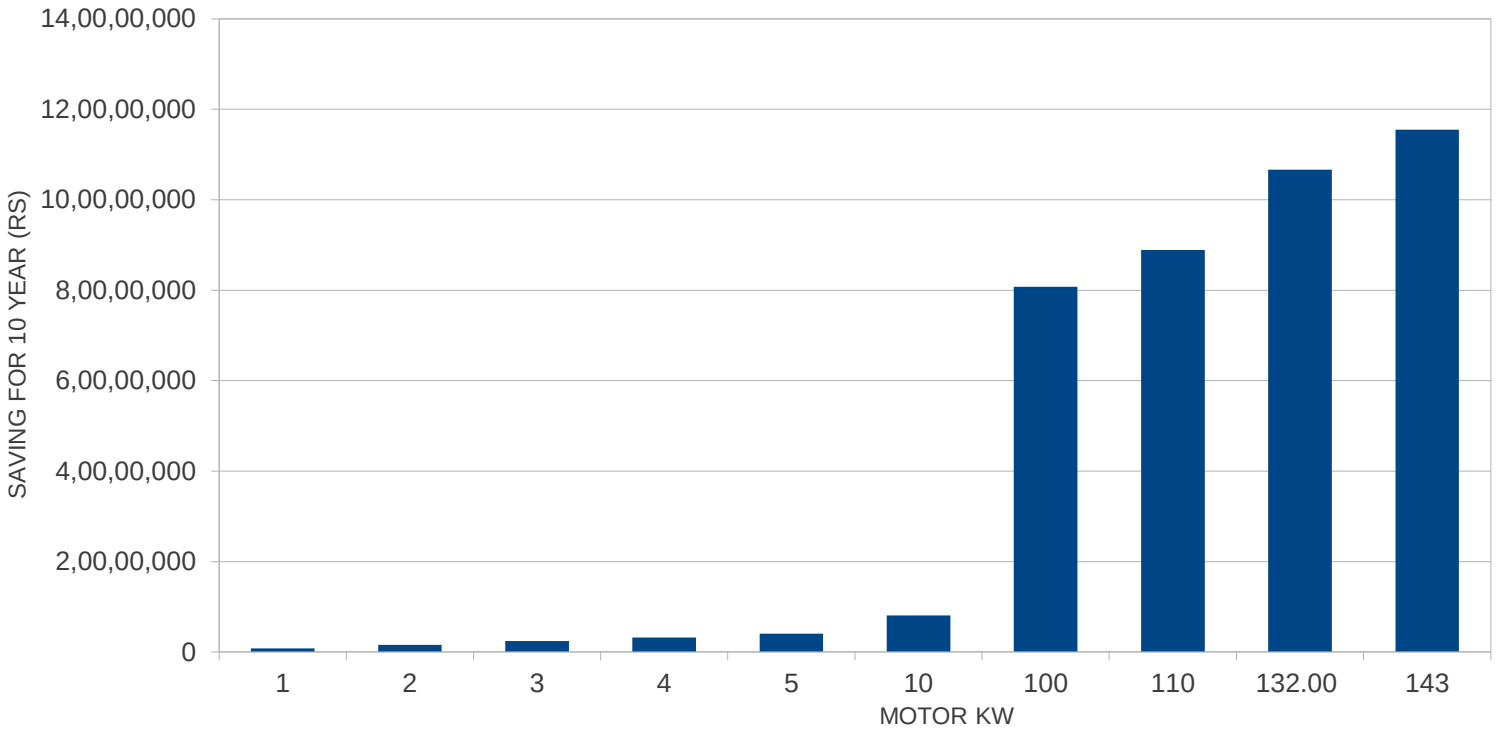
- **Due to fan power cost**
- **Due to manpower cost**
- **Due to repair cost**
- **Due to maintenance cost**
- **Due to revamp cost**

MONEY EARNING CALCULATIONS SAVING

UNIT RATE	RS. 8	RS. 10	RS. 12
COST OF 1 KW POWER	57,600/-	72,000/-	84,400/-

EXAMPLE

QUICK PAYBACK PERIOD SAVING TABLE				
WHEN YOU BUY ARMEC JET COOLING TOWER INSTEAD OF FAN TYPE COOLING TOWER				
	SAVING/YR 2017 TO 2019	SAVING/YR 2020 TO 2022	SAVING/YR 2023 TO 2026	POWER CONSUMPTION FOR 10 YEARS
MOTOR KW	Rs. 8 / kw	Rs. 10 / kw	Rs. 12 / kw	
1	1,90,080	2,37,600	3,80,160	8,07,840
2	3,80,160	4,75,200	7,60,320	16,15,680
3	5,70,240	7,12,800	11,40,480	24,23,520
4	7,60,320	9,50,400	15,20,640	32,31,360
5	9,50,400	11,88,000	19,00,800	40,39,200
10	19,00,800	23,76,000	38,01,600	80,78,400
100	1,90,08,000	2,37,60,000	3,80,16,000	8,07,84,000
110	2,09,08,800	2,61,36,000	4,18,17,600	8,88,62,400
132	2,50,90,560	3,13,63,200	5,01,81,120	10,66,34,880
143	2,71,81,440	3,39,76,800	5,43,62,880	11,55,21,120



QUICK PAYBACK PERIOD SAVING GRAPH

TOTAL COOLING TOWER CAPACITY – 2500 m3/hr					
DESCRIPTION	BASE	ARMEC JET	RCC COOLING TOWERS	WOOD COOLING TOWERS	PVC /FRP COOLING TOWERS
TOWER PURCHASE COST	Market Survey [A]	47,42,950	4,74,29,500	61,65,835	37,94,360
LIFE OF TOWER (BASED ON MAINTENANCE & USE OF OEM PARTS)	SURVEY X	15	20	10	8
TOTAL LIFE TIME POWER COMSUMPTION	[B]	NIL	25,09,05,600	8,88,62,400	11,55,21,120

LIFE CYCLE COST ANALYSIS FOR COOLING TOWER [A & B] ARMEC JET Vs RCC Vs WOODEN Vs PVC FRP

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Fill replacment	% of tower cost	Fill less	8%	40%	10%
Fill replacment	Cost in rs	Fill less	35,57,213	24,66,334	3,79,436
Fill replacment frequency in life time	Survey	Fill less	4	2	5
Total life time fill maintenance cost	[C]	Nil	1,42,28,850	49,32,668	18,97,180

Fill Replacement Cost [C]

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Motor Rewinding	% of tower cost	NO MOTOR	1%	3%	1%
Motor Rewinding	Cost in rs	NO MOTOR	4,74,295	1,84,975	1,51,774
MOTOR REWINDING FREQUENCY	SURVEY	NIL	1	1	1
TOTAL LIFE TIME MOTOR MAINTENANCE COST	[D]	NIL	4,74,295	1,84,975	1,51,774

Motor Rewinding Cost [D]

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Blade Cost	% of tower cost	NO Blade	2%	5%	7%
Blade Cost	Cost in rs	NO Blade	9,48,590	3,08,292	2,65,605
FREQENCY BLADE REPLACEMENT COST	SURVEY	NIL	1	1	1
TOTAL LIFE TIME BLADE MAINTENANCE COST	[E]	NIL	9,48,590	3,08,292	2,65,605

Blade Cost [E]

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Lovers and Nozzles Replacement Costs	% of tower cost	40%	3%	10%	6%
Lovers and Nozzles Replacement Costs	Cost in Rs.	18,97,180	14,22,885	6,16,584	2,27,662
Lovers and Nozzles Replacement Freq.	SURVEY	1	1	1	1
TOTAL LIFE TIME LOUVERS & NOZZLES MAINTENANCE COST	[F]	18,97,180	14,22,885	6,16,584	2,27,662

Lovers and Nozzles Replacement Costs [F]

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Oil Replacement + Gear Box & Misc Reapir Life Time Costs	% of tower cost	Nil	5%	15%	2%
	Cost in Rs. [G]	NIL	23,71,475	9,24,875	75,887
Toatl Life Time Structure Referbishing Cost	% of tower cost	5%	3%	10%	15%
	Cost in Rs. [H]	2,37,148	14,22,885	6,16,584	5,69,154
TOTAL LIFE TIME MAN POWER COST Rs. 6, 00,000/- PA. (10% rise every year) FOR LIFE TIME.	% of tower cost	2%	3%	8%	10%
	Cost in Rs. [I]	2,37,148	14,22,885	6,16,584	5,69,154

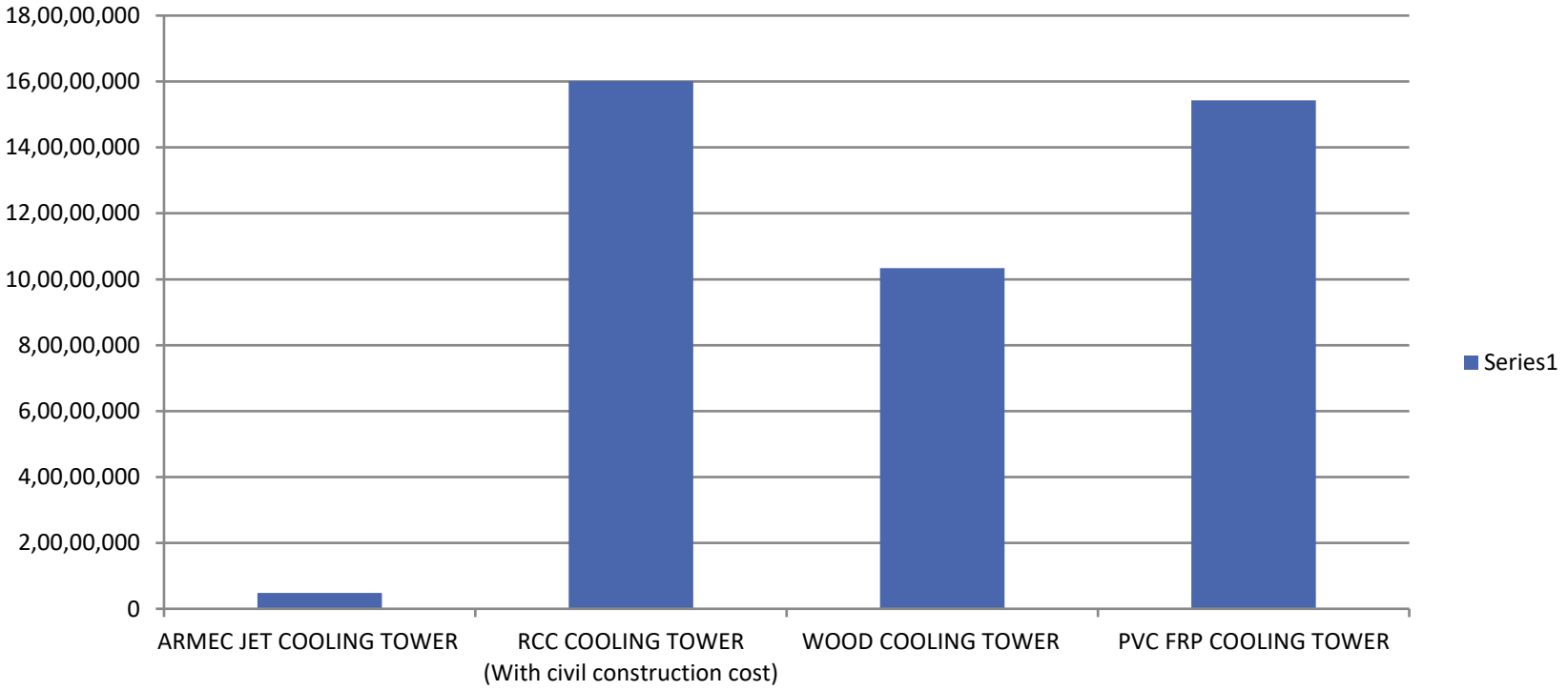
Oil Replacement, Strucuture Referbishing Costs & Man Power [G, H & I]

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
TOTAL LIFE TIME COST	A+B+C+D+E+F+G+H+I	72,58,547	32,02,35,030	10,33,77,209	12,34,58,988
	IN WORDS	SEVENTY TWO LAKH, FIFTY EIGHT THOUSAND, FIVE HUNDRED FORTY SEVEN ONLY	THIRTY TWO CRORE, TWO LAKH, THITY FIVE THOUSAND THIRTY ONLY	TEN CRORE, THIRTY THREE LAKH, SEVENTY SEVEN THOUSAND, TWO HUNDRED NINE ONLY	TWLVE CRORE THIRTY FOUR LAKH,FIFTY EIGHT THOUSAND, NINE HUNDRED EIGHTY EIGHT ONLY.

Total Lifetime Cost

Total cooling tower capacity – 2500 m3/hr					
Description	Base	Armec jet ct	Rcc ct	Wood ct	Pvc /frp ct
Per year cost (Total Life time cost / Life of tower)	IN FIGURES	4,83,903	1,60,11,752	1,03,37,721	1,54,32,374
	IN WORDS	FOUR LAKH, EIGHTY THREE THOUSAND, NINE HUNDRED THREE ONLY	ONE CRORE, SIXTY LAKH, ELEVEN THOUSAND SEVEN HUNDRED FIFTY TWO ONLY	ONE CRORE THIRTY THREE LAKH SEVEN THOUSAND, SEVEN HUNDRED TWENTY ONE ONLY	ONE CRORE, FIFTY FOUR LAKH,THIRTY TWO THOUSAND, THREE HUNDRED SEVENTY FOUR ONLY.
Ownership Cost for 10 years (All 4 types of cooling towers compared for same duration)	IN FIGURES	48,39,030	16,01,17,520	10,33,77,210	15,43,23,740
	IN WORDS	FORTY EIGNT LAKH, THIRTY NINE THOUSAND & THIRTY ONLY	SIXTEEN CRORE, ONE LAKH,SEVENTEEN THOUSAND,FIVE HUNDRED TWENTY ONLY	TEN CRORE THIRTY THREE LAKH, SEVENTY SEVEN THOUSAND, TWO HUNDRED TEN ONLY	FIFTEEN CRORE, FORTY THREE LAKH TWENTY THREE THOUSAND, SEVEN HUNFRED HUNDRED FORTY ONLY.

Cost of Ownership



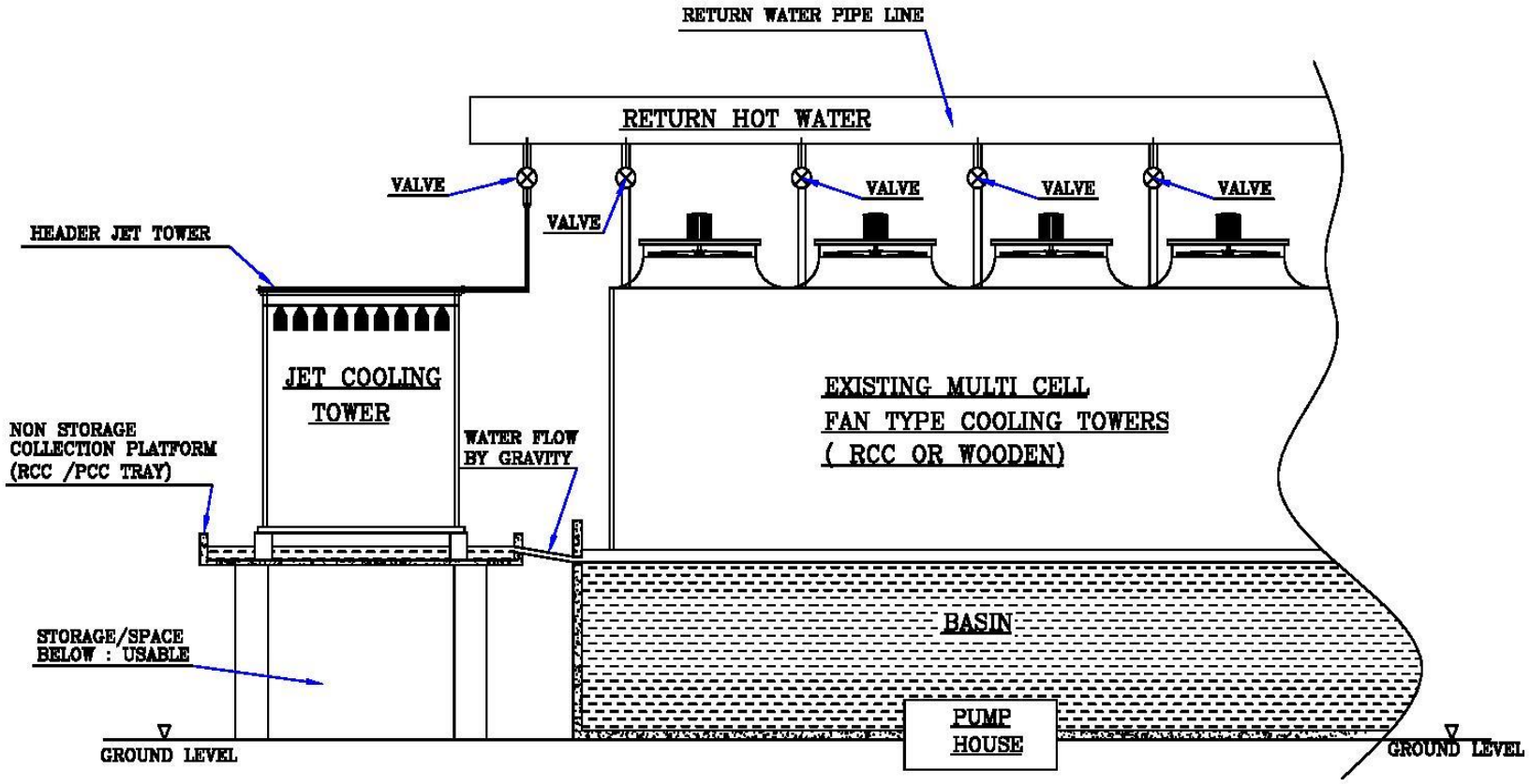
TEN YEARS LIFE OWNERSHIP COST OF COOLING TOWER

IAMS – INNOVATIVE Asset Management System

A low cost, flexible, adaptable modern technology which can support huge fan type cooling towers.

- Technologies are changing very fast.
- The RCC cooling towers envisaged, designed & installed 10 or 20 years back are becoming obsolete due to their “Old Design”.
- The newer cooling towers are more compact & more energy efficient.
- Older RCC cooling towers have regular revamp schedules + costs including RCC structure care.
- Many times such RCC towers work at reduced efficiency levels.
- In a multicell arrangement, at any given time, few cells are always under repairs & revamps due to constant ageing and due to the moving parts, vibration & packing material.

Why IAMS – INNOVATIVE Asset Management System ??


RETURN WATER PIPE LINE
RETURN HOT WATER
VALVE
VALVE
VALVE
VALVE
VALVE
HEADER JET TOWER
JET COOLING TOWER
EXISTING MULTI CELL FAN TYPE COOLING TOWERS (RCC OR WOODEN)
NON STORAGE COLLECTION PLATFORM (RCC /PCC TRAY)
WATER FLOW BY GRAVITY
BASIN
STORAGE/SPACE BELOW : USABLE
PUMP HOUSE
GROUND LEVEL
GROUND LEVEL

PEAK	PEAK SUMMER / CRITICAL MONTHS
REDUCE	REDUCE PER CELL FLOW.
IMPROVE	IMPROVE L/G RATIO.
KEEP	KEEP SAME AIR FLOW.
IMPROVE	IMPROVE PER CELL EFFICIENCY.
TOTAL	TOTAL WATER FLOW REMAINS CONSTANT AS JET TOWER TAKES THE DIVERTED FLOW.

- MAINTENANCE PREVANTIVE/BREAKDOWN
- NO NEED TO WAIT FOR WINTERS.
- ← DIVERT ONE CELL FLOW.
- CARRY OUT REPAIRS / REVAMP.
- GIVE SUFFICIENT TIME FOR REPAIRS / REVAMP.

WINTER	WINTER MONTHS NORMALY ONE OR TWO CELLS IN “OFF” CONDITION.
SWITCH OFF	SWITCH OFF MORE FANS.
USE	USE JET TOWER FOR 4 TO 5 MONTHS.

USE JET TOWER FOR ALL 12 MONTHS

RECOVER MONEY BY BETTER PERFORMANCE IN SUMMER PLUS POWER SAVING.

ONCE INVESTMENT IS RECOVERED. THIS BECOMES ZERO COST (CAPITAL+RUNNING) FACILITY FOR PROCESS.

BEST GIFT FROM UTILITY TO PRODUCTION.

QUICK ROI & “FREE GIFT” FACILITY

- Jet Cooling Towers of 3000 m3/hr to 6000 m3/hr can be installed wherein;
- No space remains unutilised
- No new pumps are added
- The hot water / return water pipe line is extended (by way of tapping) and hot water is given to Jet TowersValves are used to control / divert the required water flow,
- The Jet Towers are installed on non storage PCC/RCC slab
- The slab will be on columns where the space below can be utilised for any other purpose including storage or installation of smaller equipments
- The water falling in Jet Towers is diverted to main existing cold water basin by gravity through open channel / pipe

IAMS For a typical 30,000 m3/hr RCC Cooling Tower zone


Thank you