



# Mist Resonance Engg. Pvt. Ltd.



***Pioneers in Vacuum generation and  
Mist Cooling System since last 25 years...***







## Company Profile

The MCS technology was developed by our founder Late Mr. Arvind S. Chitale in 1980 and was recognized at various international platforms. Now we have a growing family of satisfied clients spread across various countries in many industries. They are benefited by the technology rooted in eco-friendly base, energy conservation and quality production. The systems are eco-friendly and Energy conservation is achieved at the highest level.

### Board of Directors

The present Directors of the Company are :

- Mrs. Madhuri A. Chitale : Managing Director
- Mr. Makarand A. Chitale : Director – Technical
- Mr. Bhupendra P. Shroff : Director





Member : CTI



## COOLING TECHNOLOGY INSTITUTE

PO Box 73383, Houston, TX 77273 / 2611 FM 1960 Rd., W, Ste A-101 / Houston, TX 77068  
Phone: 281.583.4087 / Fax: 281.537.1721 / email: vmanser@cti.org / http://www.cti.org

June 19, 2007

Mr. Makarand Arvind Chitale  
Mist Resonance Engg. (P) Ltd.  
1304-1/7, Shukrawap Peth, Bajirad Road  
Pune 411002 Maharashtra INDIA

Dear Mr. Chitale:

It is indeed a pleasure to inform you that your application for Corporate Membership in the **Cooling Technology Institute** has been acknowledged and approved by the **Cooling Technology Institute**.

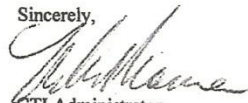
A complimentary set of **CTI** Standard Specifications and Research Reports, a membership directory, and the Bylaws are enclosed. You are now eligible to receive the updated pages of the directory once a year. Your firm will be listed in the manufacturers section of the directory with you as the voting delegate.

All employees of your firm will receive member discounts on publications and meeting fees. We encourage you to use the **CTI** logo on your letterhead, business cards and sales brochures. A copy is enclosed. The word "member" must accompany the logo.

An attractive walnut membership plaque engraved with your company name is available.

We look forward to your active participation in the meetings and committees. The next **CTI** Committee Workshop is scheduled for July 7-12, 2007, at The Westin, La Cantera, San Antonio, Texas. Information is posted on our website [www.cti.org](http://www.cti.org). We hope that you will find it convenient to attend. Please call me if you have any questions, or if we may be of service to you.

Sincerely,



CTI Administrator

VAM/  
Enclosures



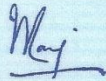
cc: w/o enclosures  
Steve Chaloupka, President  
Thomas Bugler, Vice President  
Ken Kozelski, Board Member  
Frank Foster, Membership Chairperson  
File







## Patented Technology

क्रमांक : Sl. No. :	022 4316	 सत्यमेव जयते	 INTELLECTUAL PROPERTY INDIA PATENTS   DESIGNS   TRADE MARKS GEOGRAPHICAL INDICATIONS
<b>भारत सरकार GOVERNMENT OF INDIA पेटेंट कार्यालय THE PATENT OFFICE पेटेंट प्रमाणपत्र Patent Certificate (Rule 74 of Patents Rules)</b>			
Patent No.	:	211652	
Application No.	:	298/MUM/2004	
Date of Filing	:	10/03/2004	
Patentee	:	CHITALE MAKARAND ARVIND	
<p>It is hereby certified that a patent has been granted to the patentee for an invention entitled <b>AN IMPROVED MIST PRODUCING NOZZLE</b> as disclosed in the above mentioned application for the term of 20 years from the 10 day of MARCH 2004, in accordance with the provisions of the Patents Act,1970.</p>			
Date of Grant: 06/11/2007		 Controller of Patents	
<p>Note.-The fees for renewal of this patent,if it is to be maintained , will fall / has fallen due on 10 day of MARCH 2006 and on the same day in every year thereafter.</p>			





# MCS TECHNOLOGY

## TECHNOLOGY OF MIST COOLING SYSTEM

**MIST COOLING SYSTEM** is a high efficiency system, which ensures an approach of 1°C to Wet bulb temperature. MCS is the only system which ensures a  $\Delta T$  of 50°C in one stroke. No other cooling system can operate with such efficiency & it makes cooling tower/spray pond systems obsolete.

**MCS** induces water to intensive atomization- i.e. water particles are subdivided to around 5 microns. The atomized particles shoot out of MIST-CREATOR nozzles at immense speed and rise to a height of 5-6 meters above the nozzles.

This ensures extensively large surface area for a longer interval and at high velocity providing a mist formation. Surface evaporation is very fast, faster than the time needed for reaching equilibrium.

This is similar to phenomenon of formation of hailstone, when rainwater reaches temperatures much lower than wet-bulb.





# MCS TECHNOLOGY

## TECHNOLOGY OF MIST COOLING SYSTEM

**MCS** simulates nature and temperature as low as wet bulb temperature is achieved. This is just not possible in conventional spray or cooling towers - where ultimate temperatures are 5-7°C higher than prevailing wet-bulb temperature.





# **PRODUCTS FOR SUGAR INDUSTRY**

- 1. Advance Mist Cooling System**
- 2. Mist Cooling Tower (MCT)**
- 3. Louver Type Mist Cooling System**
- 4. Mist Type Single Entry Condenser**





## ADVANCE MIST COOLING SYSTEM

*High efficiency Cooling in Pond of small size*

MIST COOLING SYSTEM is used as a superior alternative for various types of spray systems and conventional cooling towers. Due to unique design of our Advance MCS, you can expand your sugar factory without any extension of your spray pond.

While expanding the plant capacity it becomes necessary to extend the Spray Pond, causing tremendous civil construction cost as well as consuming additional space. Considering this aspect, MREPL has introduced a new concept of Revolutionary 8-way Header Design with Enhanced Efficiency Mist Creator Nozzles. It is now possible to install entirely new MCS for Final expanded capacity of Sugar Plant by replacing old Spray System in the existing Spray Pond only, saving considerable cost and space. This is achieved without compromising the original efficiency of our Mist Cooling System.

Advance MCS ensures a constant cold water temp. of 32°C with a temperature drop of 10°C to 12°C throughout year with a very low working pressure of 0.8 to 1 kg/cm<sup>2</sup>. **Advance MCS has been successfully commissioned at various plants with Gravity Condensing System also.**

You may also adopt our "Louver Type Mist Cooling System (LTMCS) Design" which requires very small area, which many Sugar Plants have started adopting



*Advance Mist Cooling System.*



*Louver Type Mist Cooling System.*





# Salient Features of Advance Mist Cooling System

## 1] TEMPERATURE DROP/APPROACH TO WBT

- **Mist Cooling System can ensure an approach of 4°C to wet bulb temperature with a temperature drop of 10°C as against 6-8°C in case of Cooling Tower or spray pond.**

## 2] BENIFITS ON PROCESS SIDE :-

- **Better Vacuum at Pan Station ensuring low temperature boiling.**
- **Savings on steam due to low temperature boiling.**
- **Better quality of sugar and higher exhaustion of Molasses.**





### 3] MAINTENANCE FREE OPERATION

- Our MCS is manufactured from Saran<sup>3</sup> PVC, a special polymer, which is totally resistant to corrosion, erosion etc. thus ensuring a very long life of 15 to 20 years.
- Also all our material is tested to a pressure of 4 Kg/Cm<sup>2</sup> while the system pressure is only around 1.5 Kg/Cm<sup>2</sup>.

### 4] BIOLOGICAL ASPECTS

- MCS ensures efficient atomization and the consequent absorption & retention of air by water particles thus causing aeration of water, showing better BOD & COD values.

### 5] PAY BACK PERIOD

- Due to all the benefits highlighted above MCS ensures a Pay-Back period of around 1 season only.





# COMPARISON BETWEEN OUR MIST COOLING SYSTEM & SPRAY/MICRO SPRAY COOLING SYSTEM.

SR. NO.s	DESCRIPTION	SPRAY / MICRO SPRAY COOLING SYSTEM	ADVANCE MIST COOLING SYSTEM
1)	Temperature Drop ( $\Delta T$ )	6 to 8°C	8 to 9°C
2]	Approach to Wet Bulb Temperature (WBT)	7 to 8°C	6 to 7°C
3)	Guaranteed Cold Water Temperature in Summer	34 to 35°C	33±1°C
4)	Spray Particle Size	5 MM	Average 50 Microns
5)	Material of Construction Of Nozzles.	Plastic	Saran3 PVC (Mixture of Saran Polymer/ FRP/PVC with S.S 304 insert)
6)	Branch Piping	PVC Suitable up to 4 Kg/Cm <sup>2</sup> (Local make)  <u>OR</u> SS 409/410 low grade stainless steel which corrode very fast	Rigid PVC, UV tested with flanged fitting.
7)	Support for Piping & Nozzles	No Supports used. (This causes fall of nozzles rapidly.)	All flanged Tee used to support pipes with HDGI chairs & arm Supports
8)	Individual Line Isolation Valves	Not Provided	Cast Iron Valves with S. S. 304 internals provided for all branch lines.
9)	Type of Fittings	Threaded	All Flanged
10)	Pond Area required	Very high	Small





## **MIST COOLING TOWER (MCT)** *for condensate water cooling in Stainless Steel 304 MOC*

Mist Cooling Tower built out of complete stainless steel material of construction is effectively used to cool hot water from 90°C to around 32°C in one stroke, thus saving huge amount of pumping / fan power. Plot size required is equivalent to Cooling Tower. Due to special Material of Construction which is suitable for Hot Water Temperature upto 95°C, it ensures a minimum life of 10-15 years.







## LOUVER TYPE MIST COOLING SYSTEM

*for Co-Generation Power Plant*

Louver Type Mist Cooling System (NO FANS USED) is used for water cooling in Power Plants as a superior alternative to conventional cooling towers.

MCS ensures an approach of 2 to 3°C to WBT with a  $\Delta T$  of 10 to 12°C. The head required for MCS at GL is equivalent to the height of Cooling Tower. Hence power required at Circulation Water Pumps remains same for Mist Cooling System & Cooling Tower. However MCS does not require any Fans, thus saving huge amount of Power.

This is ultimate solution for Power Plants in order to maintain designed vacuum of 0.1 ATA throughout the operation.

Due to **NO MOVING PARTS**, Choke-less Nozzle design & Fill-less / Fin-less design, MCS offers maintenance free operation throughout its lifetime.





# Salient Features of LTMCS

LTMCS has an unmatched features. Briefly they are as follows:

## 1. COLD WATER TEMPERATURE

Mist Cooling System ensures an approach of  $1^{\circ}\text{C}$  to WBT with a temperature drop of  $10^{\circ}\text{C}$  to  $12^{\circ}\text{C}$ .

## 2. PROCESS BENEFITS & ENERGY SAVINGS

### ON COOLING WATER SIDE :

Due to increase in DT, water quantity required at the process side is much less. MCS requires water pressure equivalent to the height of cooling tower as shown in the following diagrams. Hence, considerable amount of energy is saved on circulation water pumping. Also, MCS does not require any fans for cooling. Thus, a huge amount of energy is saved on circulation and co





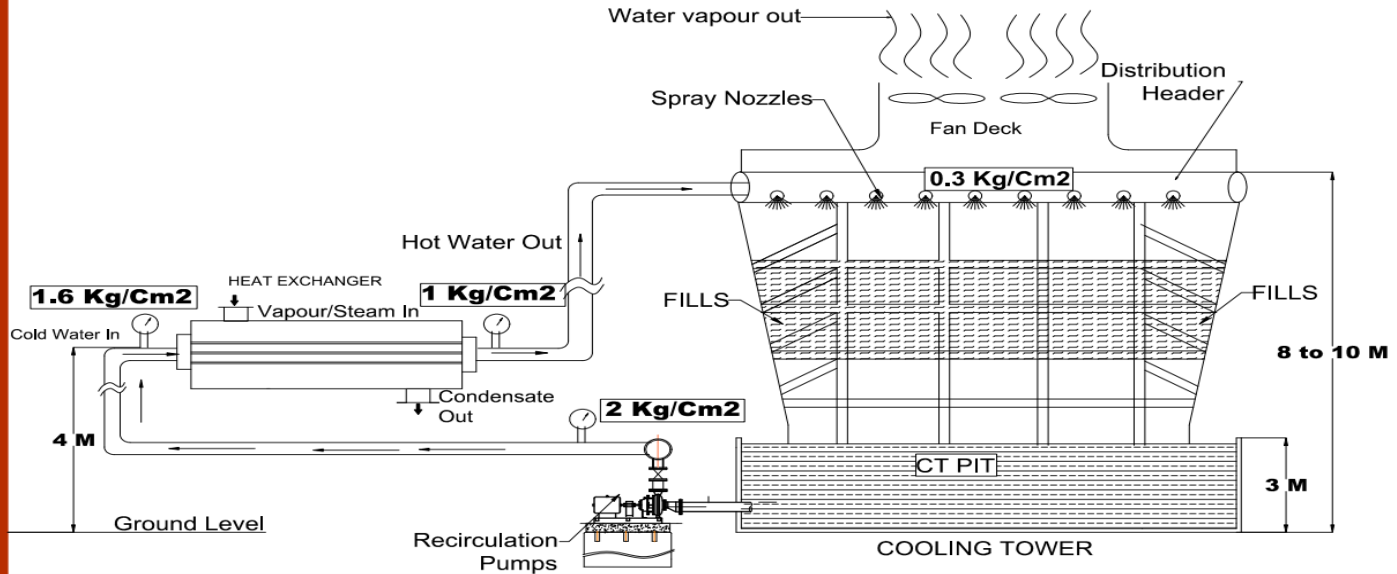
## **Salient Features of LTMCS**

### **B) ON COOLING WATER SIDE :**

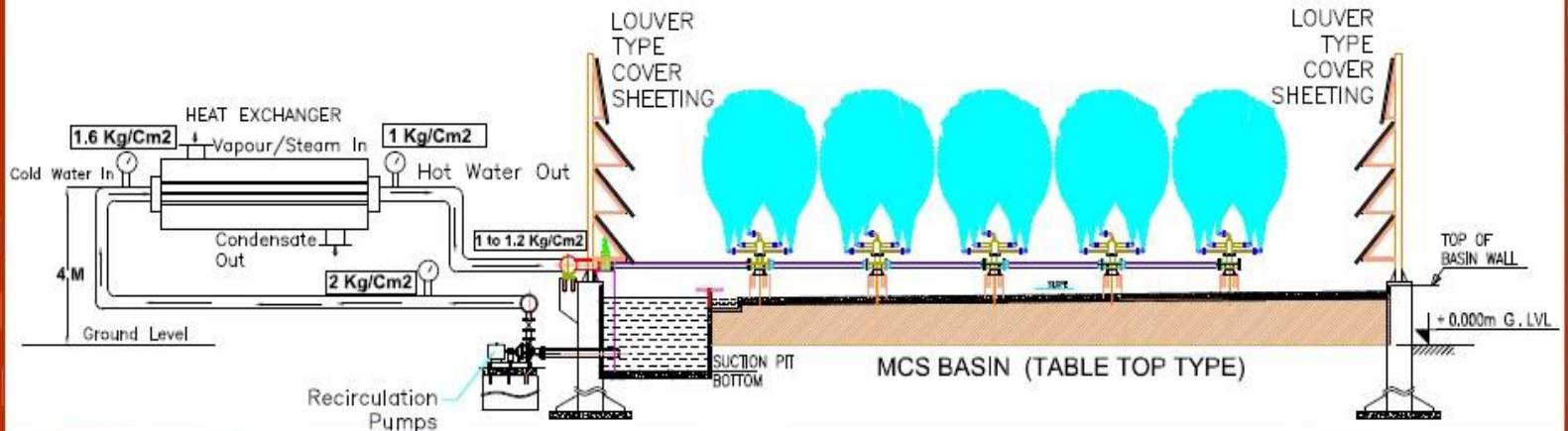
**Due to increase in DT, water quantity required at the process side is much less. MCS requires water pressure equivalent to the height of cooling tower as shown in the following diagrams. Hence, considerable amount of energy is saved on circulation water pumping. Also, MCS does not require any fans for cooling. Thus, a huge amount of energy is saved on circulation and cooling.**



# PLAN A : HEAT EXCHANGER WITH COOLING TOWER



# PLAN B : HEAT EXCHANGER WITH MIST COOLING SYSTEM







# Salient Features of LTMCS

## 3. MAINTENANCE

MCS has no moving parts. Also the material used in the mist cooling system is special grade saran polymer, a highly non-corrosive material having a life of more than 15+ years. This makes MCS absolutely maintenance free. As against this, cooling towers require a heavy maintenance in form of replacement of louvers, fan blades, clamps etc. every year.

## 4. CHOKELESS DESIGN

MCS operates with a choke less design. Size of smallest opening in MCS is more than one inch (25 MM) in diameter. Hence chances of particles choking the system are minimum.





# Salient Features of MCS

## 5. TABLE TOP DESIGN TO PREVENT ALGAE FORMATION

Latest table top design of MCS pond does not allow formation of water level inside the pond and all water passes to suction pit which is covered from top thus minimizing chances of algae formation.





# Salient Features of MCS

## 6. MAKE-UP WATER REQUIREMENT

Due to latest Louver Type design, drift loss through MCS is reduced to 0.02% while maintaining an approach of around 1°C to wet bulb temperature. Hence, Overall make-up water quantity required is approximately same as compared to cooling towers.

## 7. PAY BACK PERIOD

The Pay Back period of the MCS will be less than **ONE** year only.

However, plot size requirement for Louver Type Mist Cooling System is also 2 to 4 times in comparison to conventional Induced Draft Cooling Towers. Hence to eliminate this limitation recently a revolutionary model of Induced Draft Mist Cooling Tower is launched.





# Salient Features of MCS

## VARIOUS DESIGNS OF MCS TO SUIT SITE CONDITIONS

### A) OPEN POND MCS

Here, MCS ensures an approach of  $1^{\circ}\text{C}$  to WBT with a  $\Delta T$  of 12 to  $15^{\circ}\text{C}$ . Water loss due to drift is 0.1 to 0.25% depending on wind load.







# Salient Features of MCS

**VARIOUS DESIGNS OF MCS TO SUIT SITE CONDITIONS**

## **B) TABLE TOP DESIGN TO PREVENT ALGAE FORMATION**

Latest table top design of MCS pond does not allow formation of water level inside the pond and all water passes to suction pit which is covered from top thus minimizing chances of algae formation.







# Salient Features of MCS

## WATER QUALITY

**MCS ensures efficient atomization and the consequent absorption & retention of air by water particles thus causing aeration of water, showing better BOD & COD values.**

## SYSTEM FLEXIBILITY (CAPACITY TURN DOWN RATIO)

**MCS is offered with individual line isolation valve. MCS is the only system, which gives such a high flexibility in operation.**



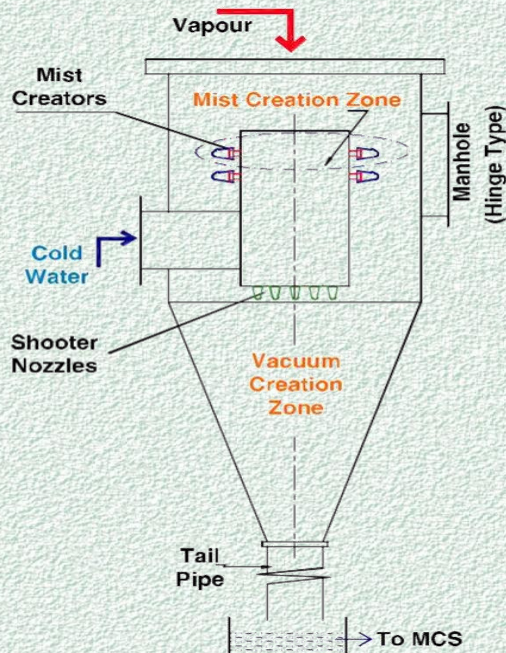


# **MIST TYPE SINGLE ENTRY CONDENSER**





### BLOCK DIAGRAM



## MIST TYPE SINGLE ENTRY CONDENSER

*for Energy Conservation*

Our uniquely designed single entry condensers work on the principal of mist formation, and ensures required vacuum of 650 mm hg with minimum water to vapour ratio of 35 to 40 kg/kg . All nozzles inside the condenser are made out of stainless steel 304 M.O.C. with chokeless design thus making these condensers far more superior than other available condensers in the market. Condensers can be offered in manual or Fully Auto mode.

### Direct Benefits of Mist Type Condenser

1. Approach of **6 to 8°C** to vapour temperature
2. Steady Vacuum upto 660 mm Hg
3. Water to Vapour ratio : 35 to 40 Kg/Kg
4. Very low water consumption & hence huge saving in power
5. Pay Back Period of less than 1 year

### Indirect Benefits of MCS with Mist Type Condenser

1. Higher Production Capacities
2. Huge saving in steam consumption for same capacities of boiling house
3. Better Quality and Quantity of product
4. Very low maintenance cost

### Special Features

1. Mist Formation inside the Condenser
2. Quick Vacuum Development in less than 2 minutes
3. 30 to 40% Saving in Power over conventional Systems
4. Minimum life of 15 years due to high quality material used





## TABULAR COMPARISON BETWEEN MREPL MAKE MIST TYPE S.S SINGLE ENTRY CONDENSER & OTHER MAKE SINGLE ENTRY CONDENSER.

Sr. No.	Description	Other Make Single Entry Condenser	MREPL Make Mist Type Single Entry Condenser
1.	Water to Vapour ration (kg/kg)	60	40
2.	Approach of Condenser	10 to 12°C	8°C
3.	Vacuum Obtained	600 to 625 mm Hg (20-25 Inch Hg)	650 mm Hg (26 Inch Hg)
4.	Time for generation of Vacuum in Hot Condition.	3 Minutes	2 Minutes
5.	Material of Construction of Body	Low grade S.S. with <u>4 to 6% Nickel</u>	Prime grade S.S. 304 <u>with 8% Nickel</u>
6.	Material of Construction of Nozzles	Polymer / PVC (Very low life at high Temperature )	S. S. 304, Prime grade
7.	Life Cycle	5 Years Max	20 Years +
8.	Company Credentials / Status	Fabricators making all types of equipments as per OEM designs.	Pioneers & manufacturer of ONLY VACUUM & COOLING SYSTEMS





# Some of our prominent Clients



**Vitthalrao Shinde**  
Sahakari Sakhar Karkhana Ltd.







## Setup of MCS







## Creation of Mist with MCS







## *Louver Type MCS*







## *Louver Type MCS : Inside View*







*Louver Type MCS : Inside View*







***Louver Type MCS : Installed in Existing CT Pit***







*Louver Type MCS : Top View*







## *Open Pond Design : Arial View*







## *Open Pond Design*







## *Open Pond Design : Partial operation*







## *Open Pond Design*







## *Open Pond Design : Operating along with existing Cooling Towers*







*Open Pond Design : MCS working in part of existing Reservoir*







***Open Pond Design : Operating at existing reservoir***







# **Case Study for Installation of Advance Mist Cooling System & Mist Type SS Single Entry Condensers For**

**M/s. SAHYADRI S.S.K. LTD., Karad,  
Maharashtra.**





Sahyadri, one of the biggest Sugar Factory in Maharashtra. Average crushing of sugar cane is 8000 TCD. Before installation of our System, Karkhana was using Standard Multijet condensers & spray pond. Average vacuum obtained at the pan station was only 23 to 24" & hence boiling temperature were as high as 72 to 75°C. Also, temperature drop obtained from the spray pond was only 6 to 7°C worsening the performance.

Total energy consumed for entire condensing and cooling was around 2100 HP.

Due to above Karkhana was in very much trouble. They were not able to crush to the rated capacity & average crushing dropped down to 6500 TCD. Also due to non-performance of condensing & cooling system recovery of the plant dropped down. Also other inputs like power, steam etc. were used much more than required.

Karkhana was facing the above trouble for 2-3 seasons. Finally at the end of a very bad season factory decided to upgrade / change the existing system enabling them to get out of the problem.

**MREPL**, being established in the market for last 25 years, Karkhana called on us & requested us to help them get out of all the trouble they had.





**MREPL** technical team surveyed / studied the existing setup Karkhana had, recognized the flaws in the System and offered them our **MIST COOLING AND MUTLI-AT CONDENSER SYSTEMS**.

The entire system was installed in the next off-season when we replaced 19 Nos. Multijet Condensers with our Special Mist Type Single Entry Condensers and entire Mist Cooling System was installed in place of spray system.

MCS & condensers were supplied & installed in record time of 2 months in the year 2010. MCS is maintaining a constant cold water temperature of 31°C with a temperature drop of 10°C with condensers ensuring a vacuum of 26" Hg. A total water to vapour ration of 40 to 45 kg/kg is maintained. The comparative study between earlier system & MREPL make system is given below:-





**CASE STUDY WITH**  
**ENERGY CONSERVATION ACHIEVED AT SAHYDRI S. S. K. LTD.**  
**By Installation of MREPL Make MCS & Condensers**

Sr. No.	Parameter	Existing Multi-Tasking Condensers with Spray System	Mist Type Single Entry Condensers with Mist Cooling System
1]	Vapor Condensed (Avg.)	150 TPH	150 TPH
2]	Approach of Condenser	10 to 12°C	7
3]	Vacuum at Pan Station	24 to 25" Max.	26" Constant
4]	Water to Vapour Ration (kg/kg)	65 to 70	45
5a]	Energy Required (Power Consumed on Injection Pumps )	Total Water : 12000 M <sup>3</sup> /Hr Quantity (Cold + Hot) Total Power : <u>1193 KW</u> Installed Total Power : <u>1073 KW</u> Consumed	Total water : <u>7125 M<sup>3</sup>/Hr</u> Total Power : <u>450 KW</u> Installed Total Power : <u>405 KW</u> Consumed
5b]	Energy Required (Power Consumed on Spray Pumps)	Total water : <u>7125 M<sup>3</sup>/Hr</u> Quantity Total Power : <u>750 KW</u> Installed Total Power : <u>675 KW</u> Consumed	Total water : <u>7125 M<sup>3</sup>/Hr</u> Quantity Total Power : <u>375 KW</u> Installed Total Power : <u>315 KW</u> Consumed
6]	TOTAL POWER REQUIRED for Circulation & Cooling [5a + 5b]	<u>INSTALLED : 1943 KW/ HR</u> <u>CONSUMED : 1748 KW/ HR</u>	<u>INSTALLED : 825 KW/ HR</u> <u>CONSUMED : 720 KW/ HR</u>
7)	TOTAL ENERGY SAVED ON CIRCULATION & COOLING	NIL	INSTALLED : 1118 KW/Hr CONSUMED : 1028 KW/Hr
8)	Power /TCH ( KW/TCH)	INSTALLED : 5.71 KW/TCH CONSUMED : 5.14 KW/TCH	INSTALLED : 2.42 KW/TCH CONSUMED : 2.11 KW/TCH
9)	Power Saved/ TCH	-	INSTALLED : 3.29 KW/TCH CONSUMED : 3.03 KW/TCH

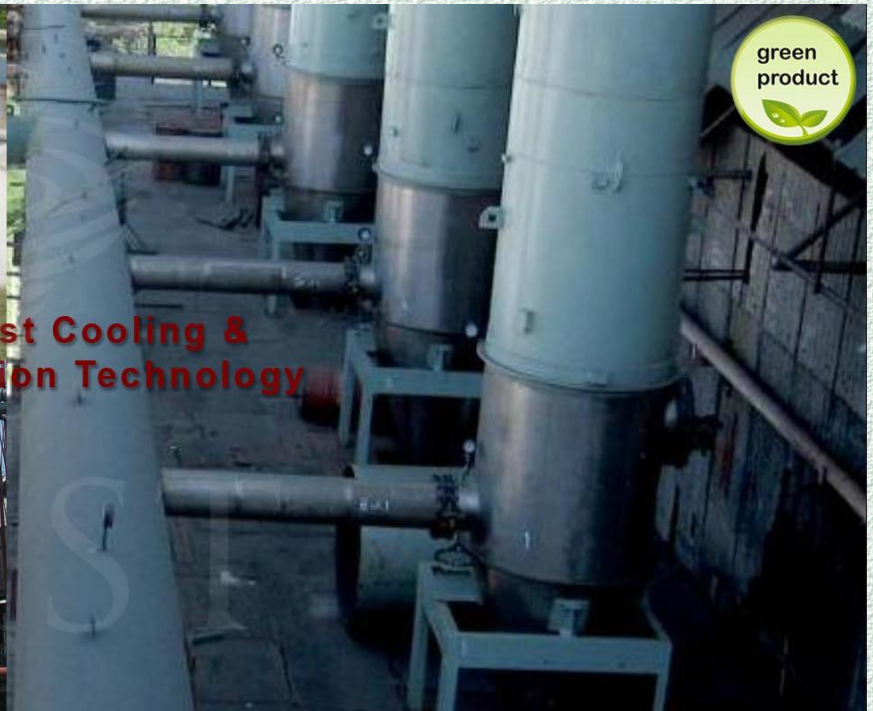




**Installation Of Advance Mist Cooling System & Mist Type SS  
Single Entry Condensers  
For  
M/s. SAHYADRI S.S.K. LTD., Karad, Maharashtra.**



**Pioneers in Mist Cooling &  
Vacuum Generation Technology**







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