

DCI (Delhi Chapter of ISHRAE)
Indian Society of Heating Refrigerating & Air Conditioning Engineers



I-SHARE

by Delhi Chapter of ISHRAE

Vol. IX, Issue 1, Edition : July 2018, Editor : Subir Das Co-editor : Yatendra Malik

EVERY DROP COUNTS

Conserve Water,
Save the Planet



PRESIDENTIAL ADDRESS

Dear Members of DCI

I am deeply conscious of the honour you have bestowed on me as the president of Delhi Chapter of ISHRAE and I pledge my commitment to serve ISHRAE during my tenure as President.

My first and most pleasant task is to thank all my predecessors for their outstanding years as President of Delhi Chapter of ISHRAE.

I heartily thank all the well wisher as sponsors supporting us time and again and standby our side to give us the moral boost to perform us with earnest effort to make every thing possible for you.

I welcome all the members of the Delhi and Delhi sub chapters of ISHRAE to the society year 2018-19 and it gives me an immense pleasure to have the opportunity to serve you all.

My team and my self are dedicated to sustain the various activities taken up by all of us till now and further carry forward to higher level and ensure to deliver high quality of program to our esteem members and HVAC&R industries at large.

We have always put more stress on advocacy to put ISHRAE at the center of industry, government and academia interface. In this contest we are pleased to inform you that recently we have associated with ASSOCHAM for their Cold Chain award ceremony in Shangri-La Hotel and World Environment Conference with MOEF on World Environment Day in Pragati Maidan at Delhi.

Professional Development Courses in the form of ISHRAE Certified Professional Courses for various application, Advanced Engineering Diploma Courses, Skill Development modules and technical workshop sessions are part of the activities conducted by us and services are rendered to the ISHRAE members with a very reasonable fee structure.

We are now focusing and engaging ourselves in the area of Refrigeration and Cold Chain and we are pleased to inform all our members that ISHRAE is conducting for the first time an exhibition on Refrigeration and Cold Chain at Ahmedabad in the name of REFCOLD India inspired by the success story of ACREX.

The two of our major programs "VENTCONF – A National Conference" & "ACRECONF - An International Conference" are scheduled for 20-21st December 2018 and 8th-9th February 2019 at Delhi.

ISHRAE have always kept focus on activity of K-12 as part of the social activity program and we at Delhi are participating with various NGOs/Govt. Schools to conduct our K-12 activities. We are pleased to inform you that GUILT FOR SERVICE have given us an opportunity to organize K-12 activity for their destitute children in RAHAT GHAR at Kashmir. We are proud to take part for this noble cause.

Today's youth are Tomorrow's future end in order to complete the adverb we have initiated lot of activities for our students at ISHRAE. Delhi Chapter of ISHRAE and its sub chapters have 20 Student Chapters having total strength of 700 odd student members. From last three years, Delhi Chapter of ISHRAE have been taking interest in providing a platform for the students to participate in the placement at HVAC&R and it's allied industries by means of Job Junction.

At the end I would like to convey from the bottom of my heart to the team members who are effortlessly have been giving their valuable time and energy for the growth of the society. I also thank all the ISHRAE members for their support to the society and would request to come forward for the betterment of the society and add more friends in ISHRAE to put together for the journey towards excellence.

Subir Das

PS: Feedback is always key to improvement, if you need to contact me with your feedback, please feel free to contact me on 9818004868 or at president@dcishrae.org

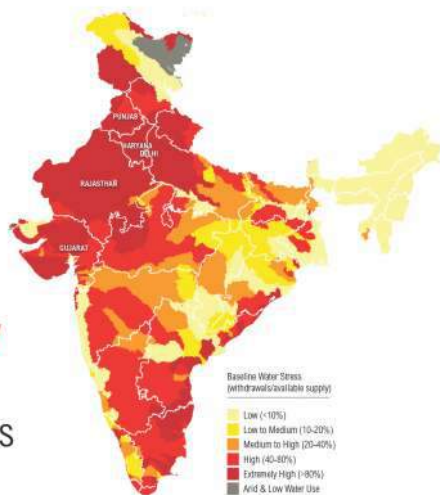


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TECHNICAL ARTICLE

54%

of India
Faces
**High to
Extremely
High**
Water Stress



www.indiawatertool.in

WORLD RESOURCES INSTITUTE

Human beings can adopt to live at higher temperatures without cooling comfort but can not survive without water. Here is an expert opinion:

“The maximum time an individual can go without water seems to be a week - an estimate that would certainly be shorter in difficult conditions, like broiling heat. The week limit is based on observations of people at the end of their lives, when food and water intake has been stopped, Randall K. Packer, a professor of biology at George Washington University.”

Courtesy- *Business Insider*

Let us not forget, we in India have been living without air conditioning till 1950s. Today however the air conditioners / Evaporative coolers can be found in homes offices, public places and factories, be it in the metro city, district town or even in the villages.

Evaporative Cooler sales in India outnumber the air conditioner sales by a factor of 5 or more but there is no standard to certify the energy and water efficiency of these appliances. Evaporative coolers use potable water for evaporative cooling. During summer, electrical energy use doubles thanks to Air conditioners and water use perhaps triples thanks to the evaporative coolers.

Every year, many cities like New Delhi face power cuts and water shortages during summers.

Bureau of Energy Efficiency addressed the energy use by air conditioners and fixed the norms for STAR/ ISEER ratings of window and split air conditioners. There is no such performance parameter fixed for Industrial or Domestic Evaporative cooler by any authority. Industrial Evaporative cooler assembled by the unorganized sector use poorest efficiency motors and pumps adversely impacting the power factor.

Back of the envelope numbers about the water used by evaporative coolers (domestic, commercial and Industrial) used for 1200 hours during the summer season in New Delhi alone will be few thousand Million Ltrs. However, so far no organization has come forward to rate the energy and water use efficiency of evaporative cooling units.

Why this apathy knowing well that water security is more important compared to energy / food security !!

Wind Chill Factor

Conventional evaporative cooler can drop the temperature of hot summer outdoor air by 10 to 12°C by increasing the humidity to an unacceptable level, some time touching 85% or even higher. The

evaporative cooling process design is focused on creating relative comfort by conversion of sensible heat to latent heat and making use of the wind chill factor. Most of the evaporative coolers use propeller fans of large diameter and run them at low speed to control the noise level.

Because of large fan opening, an air quantity required to provide the velocity for creating wind Chill becomes many times more than the quantity required to cool the space. This increased air quantity results in increase in fan motor input energy as well as wastage of large amount of precious potable water to cool even a small 10' X 12' space.

What an irony !

While the world is moving towards energy and water security, all kinds of domestic coolers are sold water tank capacity and not by their cooling capacity. How ridiculous is this where there is no reference of the comfort provided or energy and water used.

Water Wastage

An Advanced Dew Point Cooling Technology evaporative cooler using 1000 CMH of air can supply 20°C air to cool a 10-12 SQM space to a comfortable 26-28°C when the summer out door temperature exceeds 40°C, by using maximum 5-6 Ltrs. of water/Hr.

Unfortunately, the cheap movable residential or commercial coolers as well as locally fabricated Industrial Evaporative coolers available in all city and suburban markets, often use almost double the air quantity thus wasting :

- Fan energy
- Potable Water
- Unnecessary large ducting sizes

It is often found that thumb rule based equipment selection may be wasting 3.5 times more energy and water due to poor equipment selection practices !

New software based scientific equipment selection process can reduce the Capex and Opex for the user while saving valuable water and energy for the country.

Advanced Dew Point Cooling Technology

Dew Point Cooling Technology based units can supply air below 20°C to cool the space to comfortable 26°C-28°C when the summer out door temperature is 40°C or higher, by using 75% less power and a small amount of water.

When the outdoor temperatures exceeds 35°C, conventional air conditioners loose the cooling capacity and above 40°C the air conditioner capacity loss reaches 25-30% or more. Conventional air conditioners have no provision for fresh air to maintain the desired Indoor Air Quality (IAQ) in the occupied space. Whereas Advanced Dew Point Cooling technology can maintains 26-28°C for indoor comfort and best IAQ, using just 300 Watts/TR equivalent.

Conventional Evaporative Cooling units are limited by the Wet bulb temperature hence can offer supply air temperature 10-15°C below the ambient Dry bulb temperatures of the location which is typically 3-4°C above the Wet bulb temperature.

Dew Point Cooling Technology has the approach to the dew point which is always lower than wet bulb thus can drop the supply air temperatures 15-25°C during dry summers by adding the required moisture to the supply air to meet the optimum humidity requirement of the occupants.

This Advanced Canadian Cooling Technology for Complete indoors as well as Spot Cooling is now available in India through TORO Cooling Systems Pvt. Ltd.

About the Author



Sukhdarshan (Darshi) Dhaliwal is a president emeritus of ISHRAE and has been among the first 7 members of ASHRAE in India. He is the pioneer of Indirect Direct Evaporative Cooling in India and has over 40 years of R&D experience in low energy cooling systems with a mission to save energy and water. He is currently the CTO of TORO Water Air Thermal Technologies Corp., a Canadian HVAC Technology company where he oversees cutting-edge research work for the next generation of Sustainable HVAC Solutions.

ACTIVITIES@ISHRAE

CWC MEETINGS



1st CWC Meeting on 17th April 2018



2nd CWC Meeting on 23rd May 2018



3rd CWC Meeting on 22nd June 2018

STUDENT CHAPTER ACTIVITIES

ISHRAE Student Chapter Industrial visit
@ Edgetech Air system Pvt. Ltd. by DTU Students on 7th April, 2018



HI-TECH Student Chapter Re-Installation
10th April 2018



New Student Chapter Installation
-Indraprastha Engineering University on April 20, 2018



New Student Chapter Installation
at ABES on 1st June, 2018

REFCOLD INDIA ROAD SHOW



REFCOLD India Road Show
at Hotel Hyatt on 4th May 2018

WOMEN IN ISHRAE



1st Women@ISHRAE Meeting
for Society Year 2018-19 on 17th May 2018

TEAM BONDING EXERCISE



DCI Members' T 20 Cricket Match
against Dalmiya Group on 26th May 2018

TECHNICAL WORKSHOPS



Full Day Technical Workshop on "Controls for HVAC Engineers and Introduction of 'Internet of Things (IOT)'" on 21st April'2018 by Mr. P.K Goel



Half Day Workshop on "Ventilation in Healthcare Premises" on 28th April'2018 by Mr. Nitin Verma



Half Day Workshop on Latest Development on Cold Chain Infrastructure on 22nd May by Mr. K K Mitra



Half Day Workshop on "Refrigerant Trends and Outlook from Danfoss Perspective" on 28th May'2018 by Mr. Deepak Verma



Half Day Workshop on "Building Energy Simulation for ECBC 2017 Compliance" on 2nd June'2018 by Mr. Suhaas Mathur



Half Day Workshop on "Pumps and Beyond" on 22nd June'2018 by Mr. Robin Chauhan



Half Day Workshop on "Compliance with ECBC 2017 – Thermal Comfort and Control" on 26th June'2018 by Mr. Suhaas Mathur



Half Day Workshop on "Latest in Hospital Air-conditioning" on 29th June'2018 by Mrs. Samta Bajaj



Full Day Technical Workshop on "Hourly Analyses Program (HAP)" on 30th June'2018 by Mr. Shiv Kumar Batra

DISTINGUISHED LECTURE PROGRAM



Distinguished Program "Understanding and resolving Bad Odour Problem from Air-conditioning Systems" on Friday 25th May'2018 by Mr. Kapil Singhal



Distinguished Lecturer Program on "Geo-Thermal" on Friday 15th June'2018 by Mr. Richie Mittal

OUR PARTNERS



• **CORE PUMPS** is a specialist when it comes to any water application, from collection, distribution, Re-use or return it to nature. We are a leading pump manufacturer serving the fastest-growing segments of the global pump market. Core Pumps provides end-to-end pumping solutions, delivering unsurpassed quality of pumps and systems serving the industrial, commercial, building HVAC&R (heating, ventilating, air conditioning and refrigeration) and Irrigation Segments, as well as the residential water supply Segments.

Team at CORE PUMPS feel honoured to get associated with DCI. We believe in investing economic, human and technological resources in training and research in order to ensure continuous improvement of our products and through the platform of DCI. we also share this wealth of knowledge and engineering skill with young engineers and other companies which can get benefitted from same



• **GREENHECK** is the Global Leader in the manufacture of air movement and control equipment for non-residential buildings. The products we engineer and manufacture improve the quality and comfort of indoor air for people inside hospitals, schools, office buildings, libraries, restaurants, hotels, shopping malls, industrial plants, warehouses and any other type of commercial building that requires ventilation. Our employees around the world take pride in being "the easiest company to do business with," and strive to create new products that save energy, perform better, install easily and require less maintenance. We manufacture energy efficient vane axial fan, high performing Jet fans, UL certified Fire & Smoke Damper and inline cubical fans. We are proud to be associated with ISHRAE and look forward to our continued relationship.



• **Ensavior Technologies**, is a comprehensive solutions provider company engaged in Design, Engineering, Sales, Marketing and Servicing of Pumping Systems, Hydronic Balancing, Ventilation & IAQ System, TES System, Sensors & Transducers.

We promote concepts and products that to a substantial extent address the issue of energy efficiency and indoor air quality. Our strategic tie ups with Xylem, Flowcon International – Denmark, Aeropure, ESPAIR, FTENE – Korea, and Greystone – Canada form a well mix of products that cater to the need of the hour.

Ensavior is operating pan India and is actively associated with ISHRAE over the years. Participate regularly in ACREX, partner to Delhi Chapter - 2017-18, conducted Tech-Talks, Platinum partner for a Seminar on Data Centers in Mumbai. Our association with ISHRAE has brought good results in marketing of our products.

ADVOCACY PROGRAMS

- Advocacy @ INNOSKILL at Manav Rachna International University at Faridabad on 3rd April 2018
- Advocacy with Assocham on National Conference & Awards on Cold Chain at Hotel Shandri La on 22nd May 2018
- Advocacy with ASSOCHAM on Interactive session with Ministry of Food Processing of India on 31st May 2018
- Advocacy with Ministry of Environment & Forests @ World Environment Conference (WEC 18) on 5 - 7th June 2018 at Pragati Maidan, New Delhi



K-12 ACTIVITIES

At KalpVriksh NGO,
Kache Tihar, New Delhi
on 11 June 2018

Blind School Children Cricket Match of
Rashtriya Pragya Drishti Sansthan,
Rohini New Delhi



MODULE

Level 1 will have 3 modules and will require a total time commitment of 11 days. However, participants can attend each module independently on dates convenient to them. All three modules must be completed to qualify for the examination.

Candidates who need to retake the examination will have to pay a fee of Rs. 1500/- per module exam plus service tax. The candidates who are not satisfied with the exam outcome can apply for re-evaluation after paying Rs. 1000/- + service tax as re-evaluation fee. The request with payment has to be received within 30 days from the date of announcement of the results. The result of re-evaluation will be final.

Course Dates:

- 29th August to 2nd Sept 2018 (First Module), • 28 – 30th Sept 2018 (Second Module), • 26-28th Oct 2018 (Third Module)

MODULE	TOPICS	FEES	
		MEMBERS	NON-MEMBERS
1	> Basics of Psychrometry > Basics of Heat Load > Evaluation	Rs. 8750	Rs. 11000
2	> Overview of Equipment > Duct design with equal friction method > Air distribution for constant volume mixing air systems > Evaluation	Rs. 5250	Rs. 6600
3	> Duct & Pipe Insulation > Basics of water piping > Refrigerant piping > Evaluation	Rs. 5250	Rs. 6600
TOTAL		Rs. 19250	Rs. 24200

Inclusive of exam fee. Service tax extra as applicable.

To register, please contact

Delhi Chapter of ISHRAE, Plot # 1, Lane 2, Basement, Kehar Singh Estate, Saidulajab, New Delhi – 110030. Contact No.: 011-40214985, Handphone: 9205780208

www.ishrae.in

TECHNICAL ARTICLE

WATER CONSERVATION IN COOLING TOWERS

With the increasing cost of water and increasing concern over the scarcity of water for future, cooling water consumption must be well managed and reduced as far as wherever possible.

We can possibly reduce the consumption by reducing the cooling tower load and improving upon the system control, optimizing the Cycles of Concentration and minimizing the volume of bleed from the cooling tower. It is necessary to prevent any overflow within the system of operation. To optimize the water conservation in any cooling tower it is also very important to ensure the entire water balance of the cooling tower.

The water loss, which takes place within the cooling tower includes Evaporation, Bleed Overflow, Drift, Splash-out, Windage and system leaks. It is essential to have correct operation of cooling tower and the system for the outflows of evaporation and bleed-off. The control outflows need to be optimized. Uncontrolled water outflow needs to minimize or removed. Regular monitoring of a cooling tower usage pattern will identify any irregularities in water consumption. Make-up water line should have a proper water meter. The bleed water line effectively relate with the water consumption pattern. Electromagnetic flow meters are advisable in order to avoid any blockage or fouling from any particulate matter on bleed line.

Evaporation refers to the loss due to vaporization of water from the cooling tower. By evaporating water in cooling tower both the dissolve and undissolved (suspended) solids concentrates within the circulating water system. The concentration of contaminants impurities as total dissolved solid (TDS) in the circulating water needs to be controlled by bleed-off of certain percentage of water from the system and replacing with clear make-up water. Conductivity sensor for controlling the bleed-off is preferred method to control the bleed from the cooling tower. The bleed volume can be controlled by optimizing Cycles of Concentration (COC) improving the control of the bleed system by regularly maintaining and calibrating the conductivity sensors. The bleed-off connection should be located on high pressure side of the system to avoid any cause of practical difficulties with metering the volume of the bleed-off. Considering the bleed from the lower pressure side having the most contaminated water and the suspended solids with water, tends to block the solenoid valve and cause significantly uncontrolled water losses or prevent the solenoid valves from opening and preventing any bleed-off. By raising higher COC the bleed can be reduced, thereby reducing the make-up water required by the system. But, however, using higher COC there are other factors that restrict the number of COC having directly effect on efficiency of heat rejection process, reducing the components life and may increase the PH of the circulating water requiring additional or different water treatment arrangement.

The volume of water saved by increasing the Cycles of Concentration (COC) in a system can be determined by the following equation:

$$V = M \times \{(C_2 - C_1) / C_1 \times (C_2 - 1)\}$$

Where

V = Volume of water saved

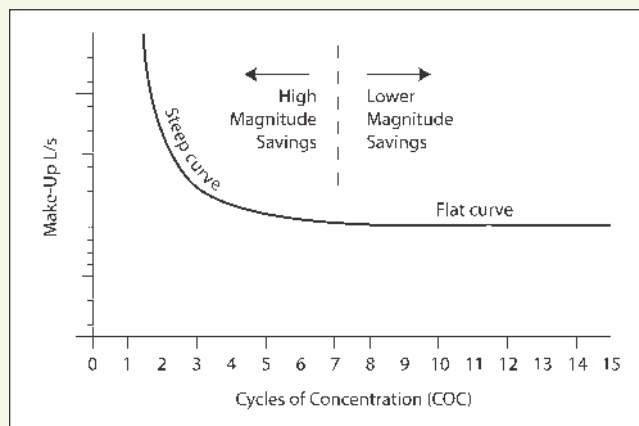
M = Initial make-up water

C₁ = Initial Cycles of Concentration number

C₂ = Final Cycles of Concentration number

Typical relationship between make-up water used and Cycles of Concentration in a Cooling Tower (10° F Range)

Drift loss refers to small water droplets that are carried by the



discharge air from the cooling tower. Drift loss depends upon the efficiency of the drift eliminator design. Modern drift eliminators can achieve drift loss less than 0.002% of the circulating water in the system. However, controlling fan speed and preventing ambient wind speed are also different ways of further reducing the potential drift loss.

Overflow refers to the discharge additional quantity of water in the basin of cooling tower. It is an uncontrolled water loss caused by water flowing back into the cooling tower basin by the circulating water pump being stopped and increasing the volume of water within the cooling tower basin. Overflow in the cooling tower can cause also due to improper pipe work design and installation. Overflow can also caused by an incorrectly positioning of make-up level. The water level in the cooling tower basin should be designed for minimum 50mm. lower than the discharged outlet of the overflow connection in order to avoid water loss air pressure forcing water out of the overflow discharge. The pump glands should be maintained with proper pressure seal controlling any pump gland leakage.

Splash-out refers to the loss of water droplets from air inlet louvers. By installing proper designed air intake louvers the splash-out of water from the system can be avoided. It needs to be ensured that the water supply pressure is not too high and the fan speed and airflow are not too high or outside the limits.

Windage refers to the water loss affected by the prevailing wind blowing water droplets out of the cooling tower either through air inlets or outlets. Windage can be reduced by protecting the tower from excessive ambient wind velocity. The orientation of the cooling tower for particular location is very essential while designing the site for the cooling tower.

Water conservation in cooling tower in true sense refer to routine or scheduled maintenance in order to minimize operational risk and provide assurance that the system design is optimized. Well maintained optimize system use less water and energy and can provide better control. Maintenance of system particularly in HVAC&R should be in accordance to the proper recommended maintenance manual.

About the Author



Subir Das is a science graduate in Physics Honours with an advance mechanical engineering from Imperial College of London having more than 35 years of experience in the field of Cooling Tower. He started his carrier with M/s. Film Cooling Towers 1925 Ltd., (U.K.) as a design engineer and worked in the cooling tower testing research Lab at Boston. He is also an author for various articles published internationally in different magazines. He has been awarded the Rashtriya Udyog Ratna Award for "Excellence in the cooling tower field" by Government of India in 2011.

Standard

Technology Components for Efficient Cold Chain



Multi Compressor Packs



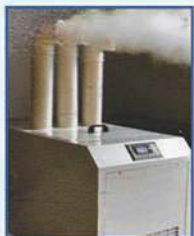
Evaporator



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**Air Cooled
Condensing Unit**



**Water-Cooled
Condensing Unit**



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