



**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Accredited by NAAC & NBA ( CSE, IT, ECE, EEE & ME) under Tier - I

Approved by AICTE and Permanently Affiliated to JNTUK, Kakinada



Department of Mechanical Engineering

LBRCE-ISHRAE Student Chapter Organized

One day workshop on

**“WATER AND AIR COOLED CHILLERS”**

Date / Duration: 12<sup>th</sup> June, 2021. 10 AM to 12 Noon

**Resource Persons**

**1.Mr.B.Anand**

Associate Consultant, Genex Consultants, Hyderabad

Ex.President, Deccan Chapter and Mentor for Vijayawada Chapter.

**2. Mr.Shaik Jilani**

Large Deals Manager, South, Trane Technologies, Hyderabad

**Mr.B.Anand** is a Mechanical Engineer, working as an Associate Consultant in Genex Consultants for the last 10 years, prior to that he worked 8 years in various countries middle-east as project manager. He was involved in many projects such as many prestigious hospitals, high rise buildings, hotels, malls etc. Across India. He has an overall experience of more than 18 years in the field of HVAC. He was the President, ISHRAE Deccan Chapter, for the S.Y.2020-21 and presently the mentor for ISHRAE Vijayawada Chapter.

**Mr.Shaik Jilani** is a Mechanical Engineering graduate with over 14+ years of experience in sales and marketing. He is experienced in B2B and B2C sales of capital equipment's.He worked as a territory manager at Thermax Limited and also held various posts in various companies.He is having 7 years experience in the field of pate heat exchangers, 3.5 years experience in vapour absorption chillers and 5 years experience in the field of electrical chillers.

**Name of the Coordinators:**

1. Dr. P.Vijay Kumar, Professor,

2. Mr. K.V.Viswanadh, Sr.Asst.Professor

**Audience:** B.Tech Mechanical Engineering - All the ISHRAE student chapter members and non members from 2<sup>rd</sup> and 4<sup>th</sup> Year

**Total Number of Participants:** 84

**Topics covered in the one day workshop:** The fundamentals of chillers, characteristics of chillers, classification of chillers, cost estimation and analysis, emerging applications of chillers, the role of VFD in chillers.

**Objective of the Event:** To impart the knowledge on the fundamentals of water and air cooled chillers, types, characteristics, uses, applications, present demand, future demand and emerging trends of water and air cooled chiller technologies.

**Outcome of the Event:** The 84 participants who attended the webinar gave their feedback on the Resource person(s) sessions and gained knowledge on the water and air cooled chillers.

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ISHRAE

Vijayawada Chapter



STUDENTS  
ISHRAE

Department of Mechanical Engineering  
Lakireddy Bali Reddy College of Engineering, Mylavaram

Is conducting a webinar in association with

YOUTH@  
ISHRAE

ISHRAE Vijayawada Chapter  
on



## WATER COOLED CHILLERS

### SPEAKER



**Mr. B ANAND**  
Associate consultant,  
Genex Consultants

Mr. Anand is a Mechanical Engineer, working as an associate consultant in Genex Consultants for last 10 years, prior to that he has worked 8 years in various countries in middle-east as Project Manager. He was involved in many projects such as many prestigious Hospitals, High Rise Buildings, Hotels, Malls etc across India and he has an overall experience of more than 18 years in the field of HVAC. He was the President of ISHRAE Deccan Chapter for the year 2020-21 and the IPP for the year 2021-22. He is the Mentor of Vijayawada Chapter. He also held various posts in the ISHRAE & ASHRAE Deccan chapters.

**Date: 12<sup>th</sup> June, 2021**

**Time: 10:00 AM. – 11:00 AM.**

**Registration Link: <https://forms.gle/e1RdgukfwVSuoZG59>**

**Meeting Link will be send to the registered E- mail ID.**

**Mr. Md. Zaheer**

President

**Dr. P. Anusha**

Student Chair

**Dr. P Vijay Kumar**

ISHRAE coordinator, LBRCE

**Dr. S Pichi Reddy**

HOD, MECH, LBRCE

Corporate  
sponsors



NAVAJYOTHI



RSVP

Dr. P. Anusha, Student Chair,  
Contact: 9492173371

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Lakireddy Bali Reddy College of Engineering, Mylavaram

Presentation on Air-cooled Chillers to



Students Chapter

Shaik. Jilani

12/06/2021

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Water-cooled screw vs Air-cooled screw

CAPACITY	400	400
	Screw	ACS
Working Qty	1	1
Type of compressor	Screw	Screw
Installed capacity	400	400
COP at AHRI conditions	0.572	1.15
IPLV @ AHRI	0.34	0.65
Operating cost		
kwh/TR at Design conditions	0.572	1.150
IPLV	0.34	0.65
Chiller power consumption as per IPLV/hr	136	260
Primary Pump power Consumption in Kw	11.07	11.07
Condenser Pump power consumption in kw	13.8	0.0
Cooling tower power consumption in kw	12.0	0.0
Total Operating Cost Per Annum	172.9	271.1
Cooling tower evaporation drift/ blow down losses cum/hr		0
De-scaling_chemicals	Required	NA

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Improve Air-cooled chillers

1.VFD to Compressors



Variable Frequency Drive (VFD)

2.VFD on condenser fans



3.Adiabatic kits



Figure (1) a typical wire mesh installation

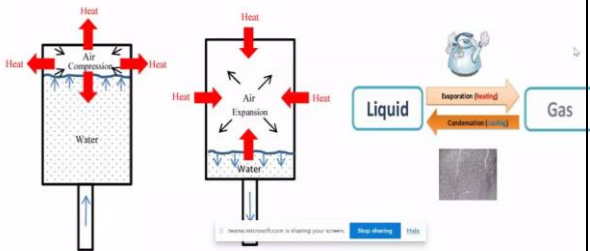
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Parameters required to select chiller

- Capacity of Chiller:200 TR
- Chilled water in/out:12.22/6.67 deg C
- DBT:35 deg C
- FF:0.0001 hr-ft2-F/BTU

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Terms using refrigerating cycle



3

Chilled Water System – Air cooled

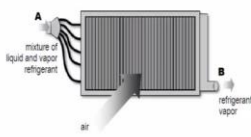


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## Basic Components

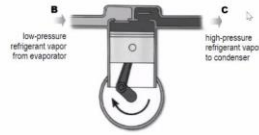
### Evaporator



- Mixture of refrigerant vapor + Refrigerant passes through evaporator.
- Refrigerant transfer the heat to other medium ( Water/Air )

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### Compressor



- Low pressure refrigerant vapor enters compressor

## Units

### One ton of Refrigeration

One ton of refrigeration = 3360000 kJ/24 hrs.  
 = 3360000 kJ/min  
 = 24360  
 One ton of refrigeration = 233-333 kJ/min  
 = 3,8889 kJ/sec  
 For calculation purpose,  
 One ton of refrigeration = 12600 kJ/hr  
 = 210 kJ/min  
 Ton of refrigeration = 3.5 kJ/s

### COEFFICIENT OF PERFORMANCE

$$\text{COP} = \frac{\text{KW Refrigeration Effect}}{\text{KW Input}}$$

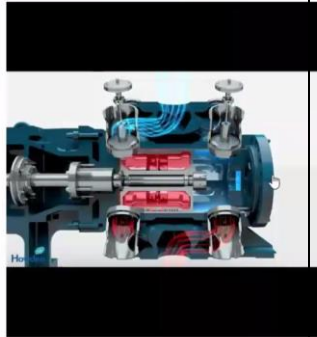
$$= 3.516 / ( \text{kw/ton} )$$

$$= 3.516 / 1.065$$

$$= 3.30$$

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## RECIPROCATING CHILLERS



## CHILLER SELECTION

$$\text{Load} = \text{Flow} \times \Delta T (\text{Delta Temp})$$

$$1- \text{Chiller GPM} = ( \text{TR} \times 24 ) / \Delta T (\text{Delta Temp})$$

$$2- \text{Cooling Tower GPM} = ( \text{TR} \times 30 ) / \Delta T (\text{Delta Temp})$$

## CHILLER SELECTION

### Diversity factor:

Diversity Factor is ratio of the sum of the individual maximum demands of the various sub circuit of a system to the maximum demand of the whole system.

**Diversity Factor = Sum of Individual Maximum Demands / Maximum Demand of the System.**

**Diversity Factor = Installed load / Running load.**

Thumb Rule : 0.7 to 0.8 of total load .

Eg : For a building HVAC load of 1200 TR

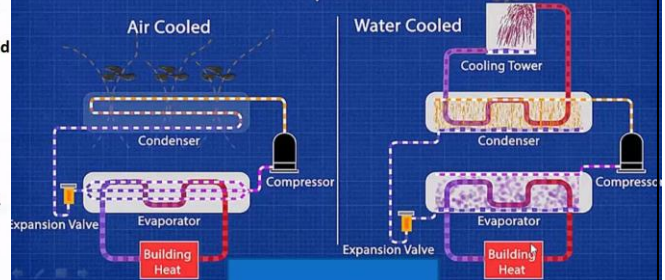
When we consider diversity at 0.8 then the load will be 1250 x 0.8 = 1000 TR.

We can select the chiller for 1000 TR capacity

## TYPES OF CHILLERS

### Chiller Types & Application

Explained

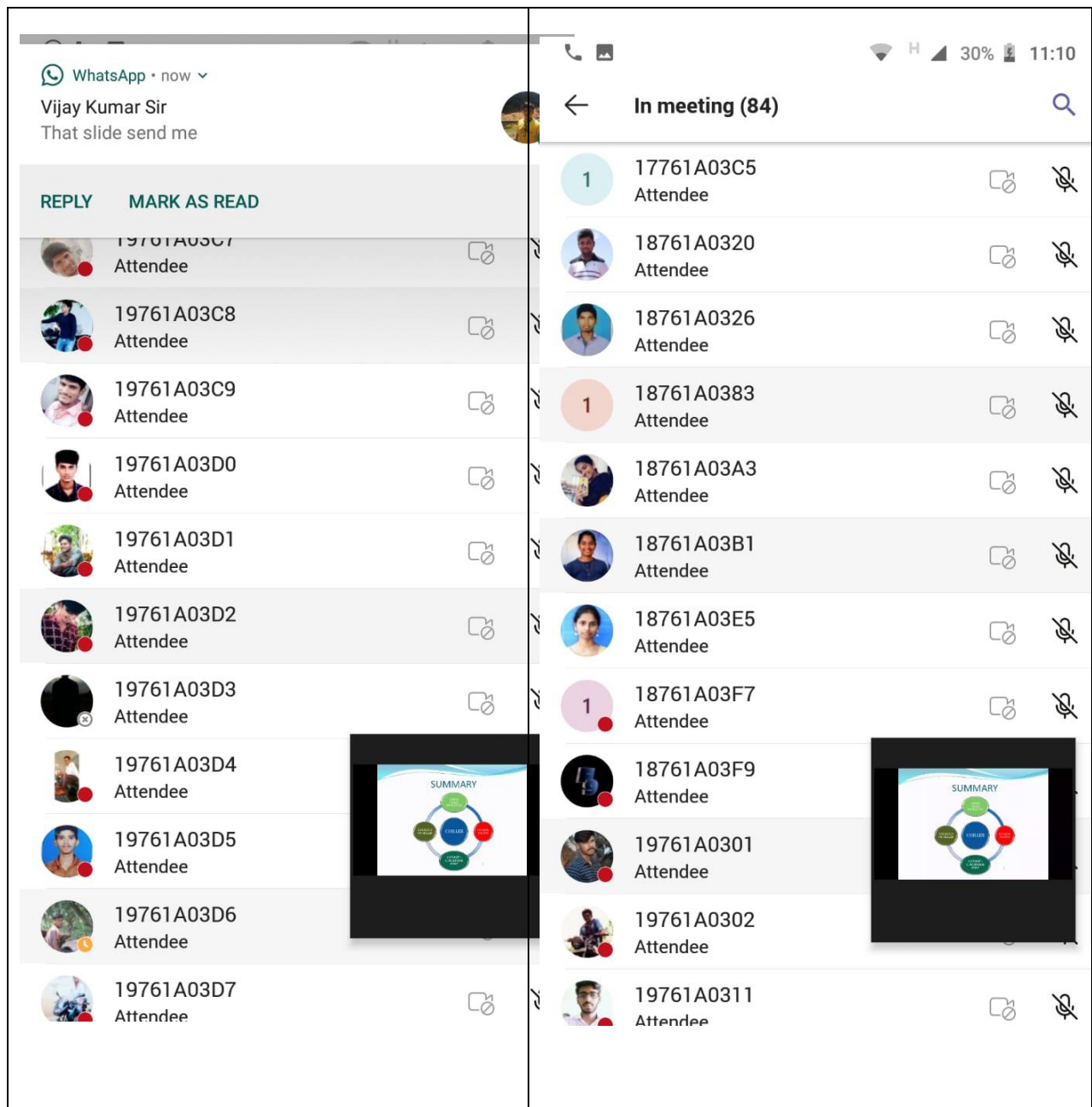


← In meeting (83)

- 20765A0338 Attendee
- 20765A0339 Attendee
- 20765A0340 Attendee
- 20765A0341 Attendee
- 20765A0342 Attendee
- 20765A0344 Attendee
- A** Anand
- A** Anusha
- GM** Guna Sahithi Madala
- J** Jilani
- S** Sandeepani
- VIJAYA KUMAR. P**

← In meeting (83)

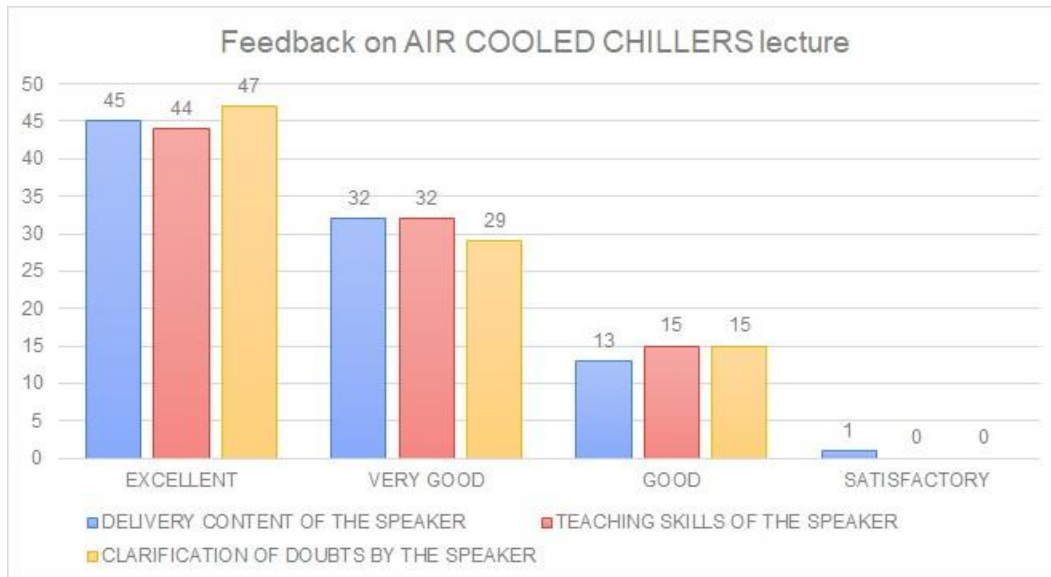
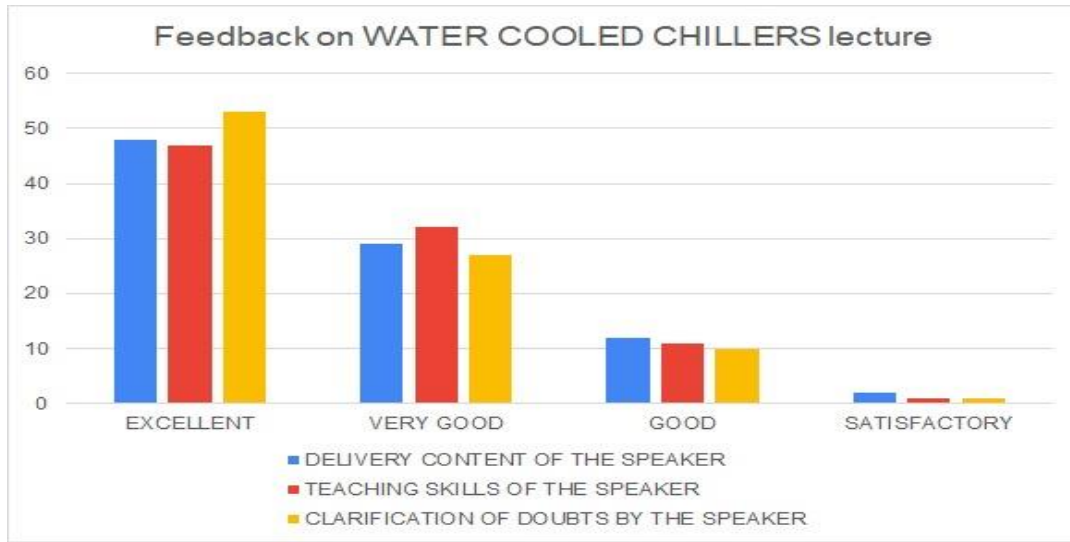
- 20765A0332 Attendee
- 20765A0333 Attendee On hold
- 20765A0334 Attendee
- 20765A0335 Attendee
- 20765A0336 Attendee
- 20765A0337 Attendee
- 20765A0338 Attendee
- 20765A0339 Attendee
- 20765A0340 Attendee
- 20765A0341 Attendee
- 20765A0342 Attendee
- 20765A0344 Attendee



**Feedback / Suggestions:**

1. To conduct advanced topics on water and air cooled chillers
2. To arrange virtual tour to Refrigeration and Air-conditioning industries

**Feedback Report:** The student participants gave their feedback on the one day workshop and the responses were shown in the form of graph given below.



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