ASHRAE India Chapter

Ashrae Headquarters
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Ashrae India Chapter
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ASHRAE INDIA CHAPTER BULLETIN

For the HVAC&R Industry.

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Presidential Message

As we strongly believe in our theme for the year and have a supremely dedicated and energetic team of BOG members, I am pleased to inform you all that we have already begun to make our efforts in building a sustainable nation. You will all be pleased to know that ASHRAE India chapter has already distributed 50 solar lamps to a remote village in Mali Gabini, Uttarakhand which was completely devoid of electricity & this village has been adopted by us. It not only showed our commitment towards our cause but also changed the very lives of the people living in that region. We believe that contributions like these, as small as they may seem create a powerful and lasting impact on the affected people. As we move along, we also plan to set up a bio-gas plant in this village, in order to eliminate the consumption of fire-wood, kerosene oil, cow dung etc, which cause significant pollution and have a low calorific value. This bio-gas plant would allow the organic waste in the village to be fruitfully used in order to provide fuel for cooking, lighting, making the village independent and self sustaining. We have also taken the initiative of setting up a solar grid within this village, providing green, clean & emission free electricity to the village. This would be a life-changer for this village that still is without power. These are some of the many activities that we have planned for the year & I will be sharing with you in my presentation a little later.

As ASHRAE India chapter, we are often criticized for not being inclusive and open to individuals from other industries, academicians & young professionals. As the president of this year, I have taken it upon myself to ensure that in the coming year we are an open & inclusive group that grooms young talent to take this platform forward. Our commitment towards this vision is stronger than ever as we step into the year 2013-14, with a BOG board that has an average age of 43 years and including renowned HVAC academicians like Dr. Rajendra Singh. I would like to highlight at this juncture that as we work as enablers to become a more inclusive platform, I would urge all of you present in this room to become more active participants on this platform & assure you that we would appreciate, encourage and be more inclusive as we move along this year.

ASHRAE as a society was setup in order to facilitate research within the industry and bring in innovative solutions in order to further the development of the industry. Keeping this thought process in mind, we as the ASHRAE India chapter we are already carrying out a research project on demand controlled ventilation & have signed a MOU for the same with Aircuity. Additionally, we also have a number of projects in the pipeline for the year which includes measuring the impact of insulation thickness on the length of piping, reducing the approach of cooling towers on energy demand of a building etc making it an exciting year for new developments within our industry. Keeping in mind our objective of making ASHRAE India chapter a more visible name in the "region at large" we have also signed a MOU with ASHRAE Singapore chapter for the purpose of research and development. We have also signed an MOU with Dr. Rajender Singh for writing three books in collaboration with ASHRAE India chapter which would be on "Good Practices in HVAC industry for hotels", "Applied psychometry" & "Operation maintenance and preventive maintenance in green buildings", which we intend to complete and publish this year.

K.D. Singh

AIC Annual General Meeting

The Annual General Meeting and installation ceremony of the new BOG (2013-2014) elected to serve ASHRAE India Chapter for the year 1st July, 2013 to 30th June, 2014 was held on Saturday, 6th July, 2013 at Magnolia, India Habitat Centre, Lodhi Road, New Delhi - 110003

Members along with their spouse graced the occasion with their presence. Pidilite Industries Limited were partner for the event.










Technical workshop on 'Selection of Glass and its effect on Heat Load Estimation'

Mr. Samdarsh Nayyar conducted an enlightening workshop on 'Selection of Glass and its effect on Heat Load Estimation' on 24th Aug., 2013 at Kailash Colony which was well attended by professional of the industry including architects from NBCC, project managers from CBRE and many others.

Innovation Driven Sustainability

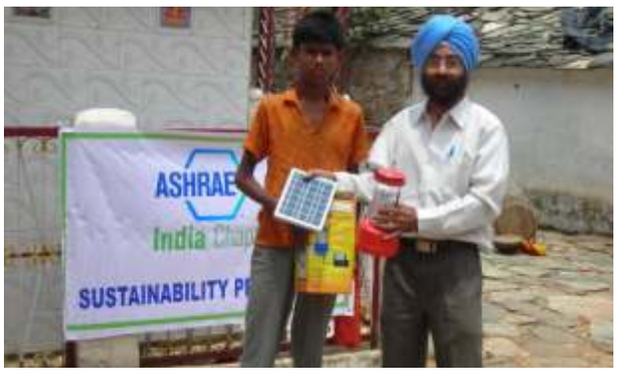
ASHRAE India Chapter's organized Sustainability Programme for the benefit of student at G.B Pant Polytechnic, Okhla . Mr. Jai Vardhan Yadav, Sustainability consultant, AECOM India Pvt. Ltd. gave a very nice presentation on 'Sustainability Programme for the benefits and awareness of the students". The programme was appreciated by students and faculty members.

ASHRAE DL Program

Technical workshop on 'Using Embedded Tube Radiant Cooling Systems to Maximize LEED Points' was held by Ashrae Distinguished Lecturer Mr. Devin A. Abellon on 6th Sept. at K-43(Basement), Kailash Colony, New Delhi. The event was very well attended by professional from the industry.

Innovation Driven Sustainability Programme

ASHRAE India launched Sustainability Programme by distributing solar lanterns to the remote villages in Uttarakhand. The solar lantern programme was launched at Delhi on 7th June in the presence of ASHRAE members. The programme was flagged of by ASHRAE India Chapter – President Mr. K.D. Singh in the presence of Mr. Ashish Rakheja, Mr. Deepak Modgil and Mr. V.K. Seth alongwith ASHRAE members at ISHRAE Education Research Federation (IERF) Centre, New Delhi. The idea is to promote Sustainability initiative taken by introducing solar lanterns to places where electricity is still a dream. Accordingly a village was selected by name which is approximately 500 Kms from Delhi in Uttarakhand. This village does not have proper electricity. Solar Lantern were distributed to the villagers on 9th June by ASHRAE representatives. The villagers appreciated the effort and expressed that this would bring a change to their living. The solar lantern once fully charged will provide atleast 7 hrs. power. These solar lanterns were specifically got manufactured by ASHRAE India Chapter Delhi.



Editorial

The new AIC – BOG had taken charge and this is the first issue of AIC – Bulletin. Several action filled activities planned this year – Seminars, Workshops, Guest lectures, Distinguished lectures, Research Promotion etc. Number of R&D projects lined up. One such project is 'Solar Lantens' distribution which was launched in June 2013. Ashrae India Chapter website has been launched and all related works can be seen on www.ashraeindia.com. The second R&D Project, planned is 'Solar Powered Cold Storage'. Workshops & Seminars will be on Energy Savings & Sustainability as one of the major titles. A number of publications also planned.

Nevertheless we will also plan to come out with News letter every 3 months. We solicit new articles & advertisements to make the news letter enthusiastic.

THERMAL INSULATION THICKNESS – A KEY TO SUCCESS

Thermal insulation system is defined as a solid barrier material applied over a flat or a cylindrical surface, which is operating at a different temperature than the ambient temperature and the purpose is to maintain the operating temperature inside vis-à-vis environment ambient condition. In HVAC Industry pipeline, duct, equipments which are operating lower than the ambient conditions, will always try to absorb heat from the environment or loose cold to the environment. Apart from heat, the moisture / humidity present in the atmosphere also get attracted towards the lower temperature operating. Thermal insulation system plays the role of providing a barrier and stop as much possible the heat coming to the lower temperature operating pipeline, duct or equipment. Depending upon the physical nature of the insulation material and its solid matrix construction, the resistance to the flow of heat from outside to inside will be determined.

The thickness of insulation depends on all of the factors of the heat transfer. The conduction loss is taken care by thermal conductivity value of the insulation material, the convection losses are taken care by wind velocity component and relative humidity of the environment and radiation losses are taken care by emissivity of the outer cladding. All these four factors and pipe orientation are input to the thickness calculation computer program (ASTM C680). Lower the conductivity, lower will be the thickness, lower the wind velocity higher will be the thickness, higher the relative humidity higher will be the thickness and lower the emissivity value, higher will be the thickness. In case of polished shining surface like aluminium foil or aluminium sheet, it is radiated out more as compared to a dull surface like plastered surface or a dark surface. A naturally finished dark or closed cell dull surface insulation will have less radiative losses.

Usually aluminium foil finish calls for higher thickness. Similarly as the humidity increases the thickness also rises. Humidity selection is very important. Usually the maximum incident humidity possible in an area should be considered or else condensation will be noticed during monsoon time. Emissivity is also important and related to condensation formation from the insulation materials at a later stage. Materials which has got absolutely smooth closed cell finish may face condensation problems at later stages when the smooth surface gets damaged due to mechanical abuses or environment impacts. There can also be a situation that the insulation may be provided a white wash coat during building renovation, which changes the original emissivity pattern and hence defining the correct emissivity is very important. One should consider all the precautions / measures for thickness selection with respect to emissivity. In case a separate vapour barrier being applied at a later stage, will also lead to condensation as thickness will also need a correction.

Usually for enclosed atmosphere the wind velocity component is taken as Zero. With Zero wind velocity, the thickness is on higher side. By providing a wind velocity component, losses which is coming out is carried away by the wind velocity thereby maintaining a proper temperature over cladding but these are actual loss and if at any point of time the wind velocity is not there, condensation will be happening. So the worst factor Zero wind velocity should be taken except where chilled water is running outside. In a shaft or inside building windage is Zero.

Thermal conductivity should be properly selected. The thermal conductivity should be calculated as per the mean temperature (Operating + Surface temperature/2). Thermal conductivity varies with mean temperature. The average mean temperature can be 20-24^{0}C.

will be continued in next issue...

K.K. Mitra
Vice President
Marketing & Technical)
Llyod Insulation (India) Limited

Sh. K.K Mitra – Vice President (Marketing & Technical), Lloyd Insulations (India) Limited, New Delhi – A 55 plus year old company, holds Post Graduate Diploma in Planning & Management with a specialization in Marketing and Finance and also, Masters in Business Administration with specialization in operation management. He has at his back 25 plus years experience at Lloyd Insulations in the areas of Thermal Insulation, Refractory lining, Cold Store, Pre-engineered & prefabricated buildings.

GREEN CORNER: By: Ashish Jain I Sustainability Senior Consultant I Building Engineering - AECOM India

NET ZERO Energy Building:

A Case Study of Eco Commercial Building

The term "net zero energy building" also known as zero-energy building (ZEB), zero net energy (ZNE) building or net zero building, is a building with zero net energy consumption and zero carbon emissions annually. It can mean different things to different people but basically, it means that you're producing as much energy on site as you're using over the course of a year. Buildings that produce a surplus of energy over the year may be called "energy-plus buildings" and buildings that consume slightly more energy than they produce are called "near-zero energy buildings" or "ultra-low energy houses".

Net zero energy building projects require careful planning, design and collaboration; careful selection of products, materials and systems is a must to insure predicable, monetized outcomes. The future of building design is all about reduced energy costs resource conservation. As the world pursues higher levels of sustainability, Eco-Commercial Building's Net Positive Energy (NPE) building status is considered as reaching a milestone in India's sustainability goals. The "Eco Commercial Building or ECB" is located at Noida in Northern India. Under Bayer Initiative for Climate Protection, this ambitious project was launched in 2007 and was conceived as a prototype for buildings of the future. This office building has a total built-up area of 9,600 sq. ft, spread over ground & first floor.

Eco Commercial Building at Noida

An integrated project delivery approach was adopted on ECB by Building Engineering Team of AECOM India, wherein the project teams discussed and brainstormed ideas to make this project a Net Zero Energy building from its conception stage itself. It is a LEED Platinum certified project and has achieved highest points under LEED India for New Construction (64 out of 69 credits) thus achieving the status of one of the "greenest in world".

ECB enjoys the privilege of being the First Net Positive Energy building in India achieved by having 100% on-site energy generation through the use of a 57kW photovoltaic system spread over a total roof surface area of approx. 444m^2.

From initial concepts, main focus of entire design team was to optimize the building design such that the building's energy demand is reduced to the minimum. Hence, the building design was highly optimized by targeting parameters like enhancement of building envelope, incorporation of passive strategies, application of intelligent lighting & daylight control strategies, optimization of HVAC system equipment selection at highest full load and part load efficiency and advanced operational strategies. Energy Efficiency measures and technologies incorporated in the building include the following:

Building Envelope:

- Insulated AAC block walls
  (U-value - 0.04 Btu/hr.ft2.deg.F)
- Highly Insulated roof
  (U-value - 0.03 Btu/hr.ft2.deg.F)
- Optimum glazed areas of 33.8% of the overall facade
- Double glazed units in windows

Lighting Design

- 87% of total regularly occupied spaces in the building are adequately daylit minimizing the need of artificial lighting. The benefits from daylighting were further maximized by using daylight sensors in daylit areas.
- Use of occupancy sensors was done in normally un-occupied areas like stores, toilets etc. to minimize misuse.
- All lighting fixtures were provided with high efficiency

digital dimmable ballasts linked to daylight sensors that cut-off artificial lighting during daytime and were programmed to gradually build it up as the dusk approached. Lighting Power Density (LPD) of 0.67 W/sq.ft is achieved in all occupied spaces, which is significantly lower than the ASHRAE 90.1 2004 of 1.1 W/sqft.

HVAC System Design

It is a conventional practice to compute air-conditioning loads using peak ambient conditions that occur either 0.4% or 1% times in a year. This leads to over-sized equipment selection, which introduces inefficiency in the system due to part-load operation most time of the year. For ECB, sophisticated computer simulation tools like eQuest and Energy Plus were employed to create year round AC load profile that enabled better understanding of operating conditions. These strategies optimized its air-conditioning load as well as its environmental footprint.

Innovation: Active Chilled Beams

As ECB has a tightly sealed envelope; chilled beams were selected as a means for achieving cooling in space. The advantages included cutting down the operational cost due to savings in AHU fan energy and simultaneous reduction in chiller energy as the beams were selected to receive the incoming chilled water from water chilling machines at 15 deg C as against conventional practice of 7 deg C.

Energy Consumption and Savings

By means of incorporating all the above strategies, annual energy consumption of Eco Commercial Building metered is 63,910 kWh. When compared to ASHRAE 90.1-2004 calibrated baseline, this translates into CO2 emission reduction of approximately 40 tons in ECB. In terms of sustainability equivalencies, this is same as preventing emissions generated by 12 passenger cars in a year. This is also the same amount of green house gases that would be sequestered by about 51.83 acre of forest.

Renewable Energy Generation

Actual on-site energy generation at ECB with 57kW grid connected solar photovoltaic system using designed using 210 Wp crystalline silicon modules is 72,023 kWh which is in addition of 8113 kWh over the 63,910 kWh consumed annually, enabling its Net Positive Energy building status. Thereby, through actual on-site energy generation at ECB, the project is able to achieve the reduction in the energy cost of approximately Rs. 360,000 each year.

It is a common knowledge that despite superior standards of design solutions and exposure to new technologies & products, there is a significant gap in the quality of execution due to poorly trained labor and conventional operation methodology. This building has proved all that to be not more than a myth.

India has to its credit several efficient traditional buildings that boast of harnessing natural resources through a climate conscious design; however, the knowledge needs to be reviewed in current context of acute energy crisis and global warming. Many countries as well as societies like ASHRAE are now pursuing to set a goal of a Net Zero Energy annual energy status for its buildings in order to effectively contribute emission reduction target of 2020. India has a golden opportunity to carve out its place by building responsibly and Bayer's Eco Commercial Building is a step towards achieving this goal of that would lead India towards Sustainability and 'Green Future'.

ASHISH JAIN
AIID, MPM, FAAPM, LEED AP, IGBC AP
Sustainability Senior Consultant, Sustainability Solutions Group - AECOM India

Ashish is a versatile and skilled professional having over a decade of comprehensive work experience. He is one of the founder members of Sustainability Solutions Group and currently heading the group.

As a Sustainability professional, Ashish has a strong professional experience within the field of sustainable building design. He has worked on issues such as passive design strategies and energy efficient design of various building types. His core expertise is in advising Architects, Engineers and other professionals of the building industry in sustainability and positively influencing their designs in order to reduce energy consumption and the negative impacts on the environment.

NOMINATIONS OPEN FOR THE

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