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VENTILATON IN GREEN BUILDING

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Abstract

Ventilation is the methods of removing Indoor gases and volatile matter. Primary energy required for a building such as heating, cooling, and lighting was responsible by the Inter-building effect. The natural ventilation should also be considered while predicting building energy demand, because it is the responsible for the confortnance and ease in the internal building temperature and these all were achieve by some mechanical way too. The natural ventilation of a building criteria were fixed as under in IS 3362-1977. Analysis is performed to determine the key input parameters among for the requirement of proper ventilation are

(i) Climatic conditions
(ii) Rate of Infiltration
(iii) Surrounding and site Opening Area percentage
(iv)Wind speed. And
(v) Height of the building

All over the world the rating of the green building were certified by LEED **(**Leadership in Energy and Environmental Design**)** and GRIHA (Green Rating for Integrated Habitat Assessment) in India specially. The objective of this study was to control the influence of the temperature and Air quality regarding with the window opening ventilation control and the building thermal mass on the energy consumption related to HVAC system in commercial buildings in India. The focus of the study was on analyses of morning to night ventilation, automatic ventilation control, and night ventilation. The combined use of a HVAC system and natural ventilation was applied using an Energy Management System. The most efficient way to provides the ventilation in a building where the population is frequent like schools , offices , and medical the methods of termite ventilation is suitable which ventilated the Air pollutant and Micro biological bacteria too. This system of ventilation is generally suitable for the low height building where it is used along with the mechanical ventilation for proper ventilation for the habitant.

Key Words : Green building, ventilation , LEED,GRIHA ,TERI

1. INTRODUCTION

Construction sector is the major cause for the emission of the greenhouse gases at global level. construction and engineering companies were very much concern about these gases emission as it lead to the global warming, increasing temperature and unsustainable energy consumption. Green building is the practice of creating structures and using processes that are environmentally responsible and resource efficient. Green building growth rapidly in the past several years. To assess for the green and sustainable the building is several green rating systems have been developed such as LEED, The Green Globes and GRIHA. To identify the role of project management that is less related to technology and Architectural engineering in developing green building rating systems. These research center were developed for finding the different parameter for the development of the Green and sustainable building in different aspect of their used, occupancy and type of the building. These suggest that project management adopted in green building construction involves both the practice and the process. The practice-mainly represented the project management body of knowledge is currently the focus of green building construction their importance of the process such as managing people, organizational structure, performance, and so on cannot be neglected, as per the evolution of the green rating systems. It is recommended that the construction and engineering companies take project management in terms of both the process and the practice into consideration when fulfilling requirements of being green.

LEED(Leadership in Energy and Environmental Design) is changing the way we think about how buildings and communities are planned, constructed, maintained and operated. Leaders around the world have made LEED the most widely used third-party verification for green buildings, with around 1.85 million square feet being certified daily.

LEED works for all buildings from residential to corporate and incorporate headquarters at all phases of development. Projects pursuing LEED certification earn points across several areas that address sustainability issues. Based on the number of points achieved, a project then receives one of four LEED rating levels: Certified, Silver, Gold and Platinum. GRIHA (Green Rating for Integrated Habitat Assessment) is an organization govern by India for manipulating and monitoring the Rating of a building in India. It is a rating tool

which assess the people, performance of a building against certain Nationally acceptable benchmark.

TERI (The Energy and Resources Institution) have the responsibity for popularizing the green building by developing the measuring and rating tool for a building. This responsible to check the parameter such as the building architect should be based on by law, Energy conservation and its orientation to be such as to maximize the use of renewable sources (Air & sunlight) and minimize use of non-renewable energy. It help in reducing the greenhouse gases emission, improve the environment and energy level ,and reduces the stress on natural resources.
Some aspect

why to make the Green building the some benefit are

- To reduce the energy consumption
- To reduces the depletion of natural resources ,biological diversities and soil erosion
- To minimize the Air and water pollution
- Increases the user productivity and
- Enhance image and market value

Ventilation is thus the major aspect for a healthy environment for a habitant in a building as it deal with the Air quality for a building. Ventilation helps in removing the polluted indoor Air by fresh air outdoor.

1.1 Ventilation

Ventilation is the method to improve the indoor air quality by removing indoor polluted air by fresh air. This is to capture idea to remove and dilute pollutants emitted in the living space to make them up to a desired and acceptable indoor air quality level. Sometime the materials used in a building are more important polluters than the habitant and contribute significantly role to degrade the indoor air

The presently the focus is to make our building more efficient and less used of the non-sustainable resources, as the resources are limited and needs are more. To over come this problem the todays building are design on the basis of GREEN BUILDING criteria as prescribed by IS 3367-1977 in which all criteria were summarized by the BUREAU OF INDIAN STANDARDS and for the comfort for the occupant and thermal mass execution they were regulated and maintained as per the ASHRAE STANDARD.

1.1.1 TYPE OF VENTILATION

A.NATURAL VENTILATION
B.MECHANICAL VENTILATION
C.HYBRID VENTILATION

A. NATURAL VENTILATION

Natural ventilation is the process of supplying and removing air through an indoor space by natural means, meaning without the use of a fan or other mechanical system. It uses outdoor air flow caused by pressure differences between the building and its surrounding to provide ventilation and space cooling.

TYPES OF NATURAL VENTILATION

There are basically two types of natural ventilation that can be employed in a building:

1. Wind Driven Ventilati
2. on (Uses Natural force of wind)
    a. Single sided ventilation.
    b. Cross sided ventilation.
3. Stack Ventilation.(pressure generated by buoyancy)

Both of which are caused by naturally occurring pressure differences. However, the pressure differences that cause wind driven ventilation uses the natural forces of the wind where as stack ventilation is caused by pressures generated by buoyancy as a result in the differences in temperature and humidity. Hence, there are different strategies in the optimization of the two types of natural ventilation.

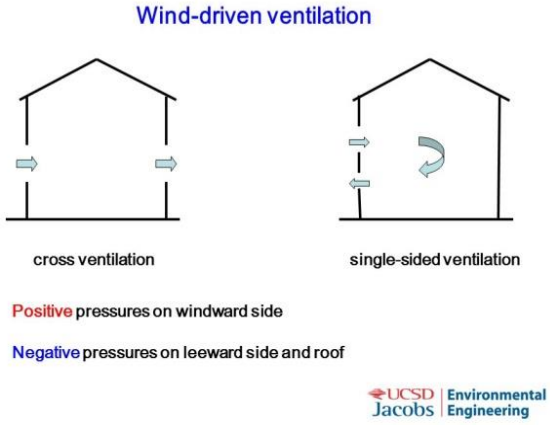

Fig. Wind Driven Ventilation

B. MECHANICAL VENTILATION

Mechanical ventilation with heat recovery (MHRV) is another whole-house ventilation system which supplies fresh air to dry rooms and extracts stale air to wet rooms. Both air flows are ducted and driven by two fans, one on the supply side and one on the extract side. The key element of this system is that it uses a heat exchanger to transfer heat from the warm exhaust air to the fresh air, achieving up to 85% heat recovery. The reduction in heat losses due to ventilation is very significant and occupants comfort is also increased as

the air supply is warmed before entering the rooms. The HRV unit which houses the heat exchanger and the fans is also equipped with filters which prevent outside dust entering the system and internal air particles depositing within the unit. Filtering the outdoor air, possibly up to removing pollen and other allergens, can be of great to people suffering of respiratory problems including asthma.

Pressure difference is caused by dynamic pressure of a fan.

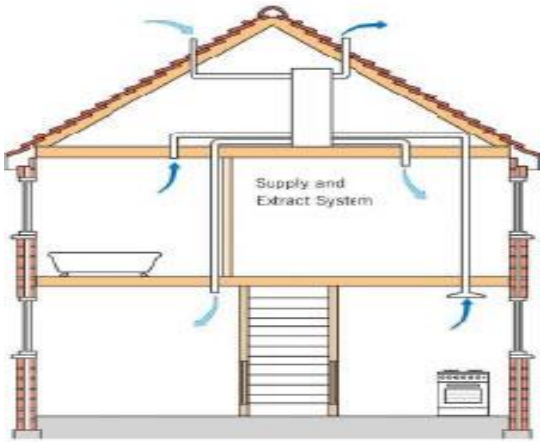

Fig. Axial Flow fan

C. Hybrid ventilation

Hybrid ventilation combines the strengths of natural and mechanical ventilation in the best possible way:

Natural ventilation is used during the summer months securing a minimum use of energy
Mechanical ventilation with heat recovery is used during the winter securing a low usage of heat
The indoor climate is ensured all year round

Hybrid ventilation solutions, will use a mixture of both natural and mechanical ventilation, but should utilise the natural ventilation the natural ventilation as much as possible, as this is based on the principle of providing healthy indoor climates and comfort, delivered with minimal energy consumption. Hybrid ventilation, or mixed mode ventilation, utilises natural ventilation during favourable conditions, and then should use mechanical, low-powered motors/fans to distribute the fresh air when the natural ventilation proves less effective.

2. VENTILATION DEPANDS ON

- Indoor Air quality IAQ
- Emission of gases from waste
- Combustion gases
- Volatile Organic compound VOC
- Humidity
- Other Air borne microbes

3. MINIMUM STANDARDS FOR VENTILATION

3.1 Standards for Permanent Ventilation - Since the amount of fresh air required to maintain the carbon dioxide concentration of air within safe limits and to provide sufficient oxygen content in the air for respiration is very small, the minimum standards of ventilation are based on control of body odour or the removal of products of combustion depending ***on*** the requirements of each case.

3.**1.1** Where no contaminants are to be removed from air, amount of fresh air required for dilution of inside air to prevent vitiation by body odours, depends on the air space avai!able per person and the degree of physical activity; the amount of air decreases as the air space per person increases, and it may vary from 20 m^3 to 30 m^3 per person per hour. In rooms occupied by only a small number of persons such an air change will automatically be attained in cool weather by normal leakage around windows and other openings and this may easily be secured in warm weather by keeping the openings open.

3.2 Air movement is necessary in hot and humid weather for body cooling. A certain minimum desirable wind speed is needed for achieving thermal comfort at different temperatures and relative humidities. Such wind speeds are given in Table 1.

TABLE 1 ;DESIRABLE WIND SPEEDS (m/s) FOR THERMAL COMFORT CONDI TIONS (Clause 4.2)

Dry bulb tempt. °C	Relative Humidity in %						
	30	40	50	60	70	80	90
28	*	*	*	*	*	*	*
29	*	*	*	*	*	0.06	0.19
30	*	*	*	0.06	0.24	0.53	0.85
31	*	0.06	0.24	0.53	1.04	1.47	2.10
32	0.20	0.46	0.94	1.59	2.26	3.04	↑
33	0.77	1.36	2.12	3.00	↑	↑	↑
34	1.85	2.72	↑	↑	↑	↑	↑
35	3.20	↑	↑	↑	↑	↑	↑

*=none

↑ Higher than those acceptable in practice.

Where somewhat warmer conditions can be tolerated without perceptible discomfort, minimum wind speeds fur just acceptable warm conditions given in Table 2 may be followed. For obtaining values of indoor wind speed above 2.0 m/s mechanical means of ventilation may have to be adopted.

4. Recommended Values for Air Changes

4.1 ***Living Rooms and Bed Rooms*** **-** In case of living rooms and bed rooms, a minimum of three air changes per hour should be provided.

	30	40	50	60	70	80	90
28	*	*	*	*	*	*	*
29	*	*	*	*	*	0.06	0.19
30	*	*	*	0.06	0.24	0.53	0.85
31	*	0.06	0.24	0.53	1.04	1.47	2.10
32	0.20	0.46	0.94	1.59	2.26	3.04	↑
33	0.77	1.36	2.12	3.00	↑	↑	↑
34	1.85	2.72	↑	↑	↑	↑	↑
35	3.20	↑	↑	↑	↑	↑	↑

*=none

↑ Higher than those acceptable in practice.

TABLE 2 MINIMUM WIND SPEEDS (m/s **)** FOR JUST ACCEPTABLE WARM CONDITIONS (Clause 4.2)

Dry bulb tempt. °C	Relative Humidity in %						
	30	40	50	60	70	80	90
28	*	*	*	*	*	*	*
29	*	*	*	*	*	*	*
30	*	*	*	*	*	*	*
31	*	*	*	*	*	0.06	0.23
32	*	*	*	0.90	0.29	0.60	0.94
33	*	0.04	0.24	0.60	1.04	1.85	2.10
34	0.15	0.46	0.94	1.60	2.26	3.05	↑
35	0.68	1.36	2.10	3.05	↑	↑	↑
36	1.72	2.70	↑	↑	↑	↑	↑

4.2 **Kitchen** - Large quantities of air are nccdcd to remvve the steam, heat, smell and fumes generated in cooking and to prevent cxccssivc rise of temperatures and humidity. However, for the requirement of kitchen in which cooking is done for a family of not more than five persons, minimum rate of ventilation of about six air changes per hour shall be provided.

4.3 ***Bathrooms and Water****-Closets* - Considerable ventilation of bathrooms and water closets is desirable after use, and the equivalent of six air changes per hour should be provided.

4.3 ***Passages*** **-** Th e period of occupation of passagth, lobbies and the like is very short and as such no special consideration is necessary in designing their ventilation system.

5 CONCLUSION

According to my study and research concern to my work has investigated in terms of significant measures for used of a axial flow fan for ventilation in a basement of a commercial building.

For a comfort living in a building ventilation plays an important role in today's infrastructure projects as ventilation is responsible for the exhaustion of the polluted and hot air and inflow of the fresh air.

A good ventilation in a residential or commercial building will depends upon the emittion of the hot or polluted gases through the habitant and due to other causes were totally replaced by the ventilated equipment which maintained the indoor air quality. The total ventilation rate were determined and maintained by exhaust ventilators.

The selection of ventilation machine were depends upon the total CFM of a building required and the static required for it. In this project the how the ventilation is done in a commercial building is taken and the selection of the ventilated fan is taken is studied**.**

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6. BIOGRAPHIES

NADEEM NISAR is a Master's student at Al-Falah University. He has published research papers in journal and conference. His research interests include construction of green building with great extent of ventilation. Currently, he is working on the development of a ventilation in green building with used of axial flow fan for ventilation