Sustainable Architecture
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Lecture - 45
Indoor Environmental Quality – V

Good morning. Welcome to the last lecture of this week, where we are discussing about Indoor Environment Quality as part of this ongoing online course on Sustainable Architecture. So, for indoor environment quality, we have discussed about the quality of air, we have discussed about the quantity of air which needs to be brought in. We talked about the thermal comfort criteria and the prescription, the relevant codes, the VOC compounds that need to be controlled; we also talked about the daylight availability in the indoor areas.

Now, besides these areas, often there are many other parameters, which are of concern when we are talking about the well being of occupants. Now largely the indoor environment quality is addressing the social dimension of sustainability for sustainable buildings, these green buildings which are largely the environmental dimension driven; but here it is about the comfort and well being of the occupants. So, in order to make the occupants feel more comfortable, there are certain other parameters, there are certain other criteria, which become of greater importance when we are talking about buildings with interiors.

So, if we are talking about green building rating programs and their specific program regarding building interiors, certain other criteria they become more important. So, in todays lecture we will cover these criteria, which may not be significant, when we are talking about new buildings, where we are not considering the interiors. But, when we are considering the green interiors, these criteria will become important.

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The first and foremost is optimization of circulation spaces. So, the intent of these particular criteria is to design interiors to ensure optimum circulation space and thereby ensuring safety and well being of occupants.

So, the compliance approach is that, the interior space should be designed in such a manner that at least 25 percent of the carpet area is used or is designed as the circulation area. However, here we are talking about the optimization, so there are two things which need to be followed in that; one that at least 25 percent of the carpet area is being used as circulation area, and the other is that as per the codes, the minimum requirement for circulation area shall be fulfilled.

If we look at codes like NBC, it governs; it clearly prescribes the amount of circulation space which should be provided in an area. So, both the mandatory criteria they must be fulfilled, if we want to optimize the circulation spaces. Now this circulation optimization of circular space is required for the safety and well being of occupants. Sufficiently wide circulation areas ensure that there are no mishaps or accidents, taking place because of crunch of circulation space; not just the wide corridors, but also the space between the work terminals is also the circulation space which has to be ensured on the basis of the codes and guidelines.

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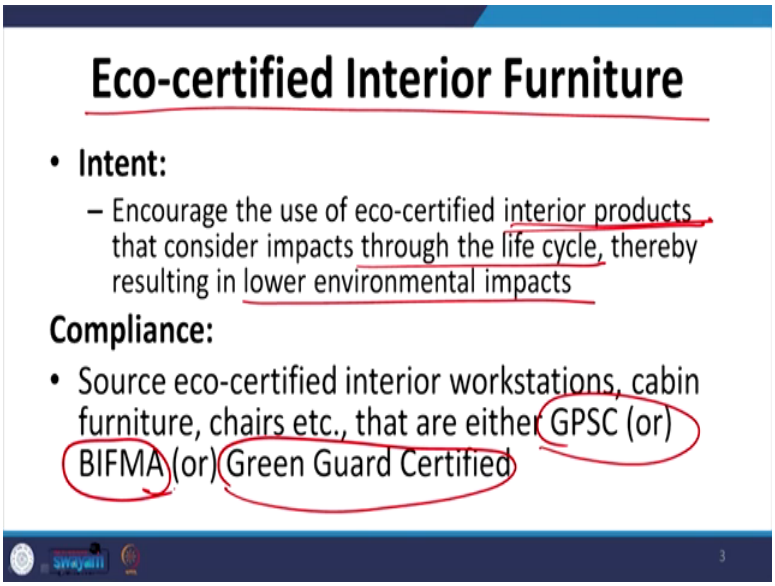

The next we have is eco certified interior furniture. So, when we are talking about interior products, we have to encourage the use of eco certified interior products; which consider the impacts because of the production of these interior products through their lifecycle. So, it is not just considering the impact, because of production of this interior product, only for a particular phase of this product, but through its life cycle; and thereby we are consciously selecting the furniture which results in a lower environmental impact.

To comply with this, we have to source interior furniture from companies which are certified either by GPSC or BIFMA or Green Guard. So, there are specific certifications which are available which certify the eco sensitive products, interior products. So, only the certified products are prescribed to be used. So, whatever interior furniture has to be use, it may be workstation or cabin furniture or chairs or any other interior furniture for that matter; it has to be supplied, it has to be used with a certification here.

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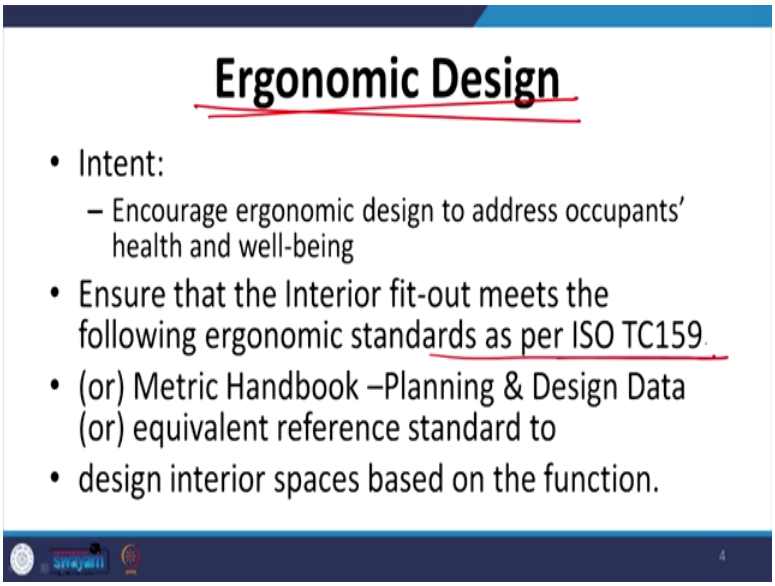

The next very important thing is using a product which is ergonomically designed. An eco-certified product may not necessarily be ergonomically designed. Now, this ergonomic design is required in order to address occupants health and well-being. Consider that in an office a person has to sit on his chair for 8 hours every day; if it is not ergonomically designed, it is bound to give health problems to the occupant later on.

And a lot of office occupants these days complain, even when the air quality is good, even when they are inhaling the best quality, it is thermally comfortable, it is visually comfortable; even then people complain of back aches, they have shoulder problems, they have problems in their hands because of their sitting posture.

So, this has to be addressed through the design of the building and the interior design through selection of ergonomically designed furniture. So, we have to ensure that the interior fit out all the furniture, it meets the ergonomic standards as per ISO TC 159; or any other relevant code which is applicable in the given country, in the given context. So, the prescribed code or the standard should be followed and properly design, ergonomically designed furniture has to be purchased and supplied. This ergonomic design and the furniture which is ergonomically designed; it becomes more important for certain types of spaces, where the occupants are forced to sit for long hours.

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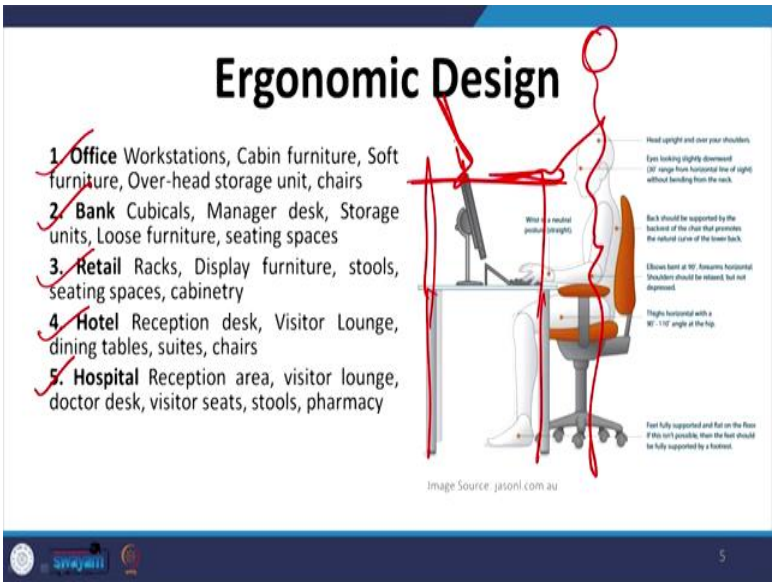

For example the offices as we were just discussing about, but offices are not the only work places where people sit for long hours on their desks; we have banks, we have retail areas, we also have the reception areas of hotels and hospitals and also the visitor lounges. So, such areas require more sensitivity towards purchasing ergonomically designed furniture.

Very interestingly a new concept of furniture is being brought in, where the occupant may continue to stand and work; so the table becomes adjustable in height. So, at times when the occupant wishes to sit, the ergonomically designed chair will provide him the seat; however, with the press of a button, the seat itself can be taken up to become a standing seat and the occupant instead of sitting can then stand and work while standing. So, this improves the posture and overall well-being of the occupants. So, the emphasis is on selecting the right type of furniture which is designed ergonomically.

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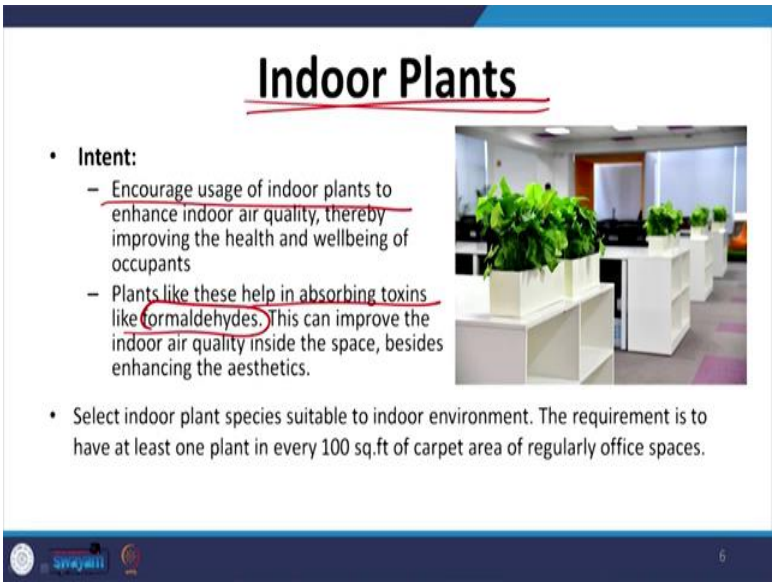

The next is incorporation of indoor plants while designing the interiors. So, first intent which we have already covered in yesterdays lecture is to ensure that the occupants have connectivity with the outdoors. We will go in detail in today's lecture, but besides providing connectivity through the windows to the outdoor views, the indoors also have to be made vibrant and colorful specially with the help of indoor plants; because they help in improving the health and well being of occupants which has been substantially researched.

So, the use of indoor plants has to be encouraged; and specific plants which improve the quality of air have to be used. The specific types of plants which help in absorbing the toxins like formaldehyde, they need to be planted. So, specific prescriptions on the types of plants which shall be planted indoors are also available and we have to select the plants carefully. But whatever the plant is, the overall ambience of the space also changes and it has a soothing effect, betterment effect on the health and well being of the occupants. So, the intent is to maximize the use of indoor plants in the building interiors.

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The next is acoustic performance; often in Indian buildings we ignore the acoustic performance of the buildings, materials which are being used in the building interior. We talk about visual comfort, we talk about thermal comfort; but we often forget about the acoustic comfort.

Now when we are talking about the acoustic comfort, we are talking about the sound levels which are present inside the building largely; and that will be dependent upon the type of materials which are being used in the building envelope as well as the interiors. So, what we have to do is, we have to ensure that the noise criteria; especially for say office types is contained within the desired limits, desired levels.

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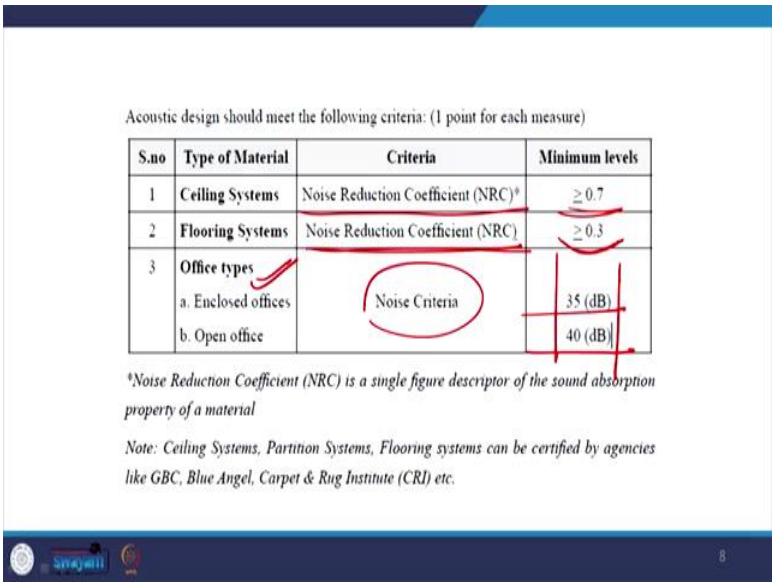

Now, the noise which is going to be there in a given space may be because of two reasons; one that the outdoor sound is transmitted inside through the building envelope. So, in case the building is right next to a highway or a very busy street, where a lot of noise is generated outdoors or may be next to a railway line; the building envelope has to be designed in such a manner that the envelope is capable of cutting down substantial amount of sound, so that the limit of sound indoors is achieved that's one.

The second is there is a lot of sound which is generated inside the office itself. So, for that the materials which are going to be used on ceilings and floorings, they have to be prescribed with minimum noise reduction coefficient, the NRC value. So, the minimum NRC value for ceilings is prescribed to be 0.7 as per IGBC and for flooring systems it is prescribed to be 0.3.

So, even when, because of the climate and the environment that we have, carpets are not required in our context; but for a multi occupant space, the carpets or specific flooring systems might be required just to ensure that the noise reduction coefficient, sufficient value of noise reduction coefficient has been achieved and the overall sound which is generated in a space is controlled within a given limit. This has a profound effect on the mental, well being and health of the occupants and we have to ensure.

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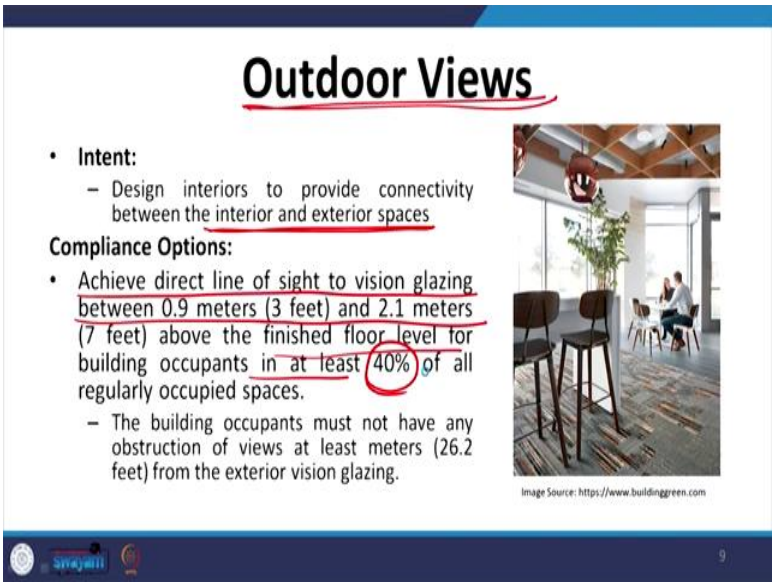

The next that we have discussed very briefly earlier also is outdoor views. So, we have to ensure that the interiors are designed in such a way that they provide connectivity between the interior and exterior spaces. Now this can be done through building design itself.

So, the building is designed in such a manner that all the work areas, wherever the occupants are going to be sitting are directly connected; they have a connectivity with the exterior spaces. To comply with this, we have to achieve the direct line of sight to vision glazing between 0.9 meters and 2.1 meters of the height above the finished floor level for building occupants in at least 40 percent of all the regularly occupied areas.

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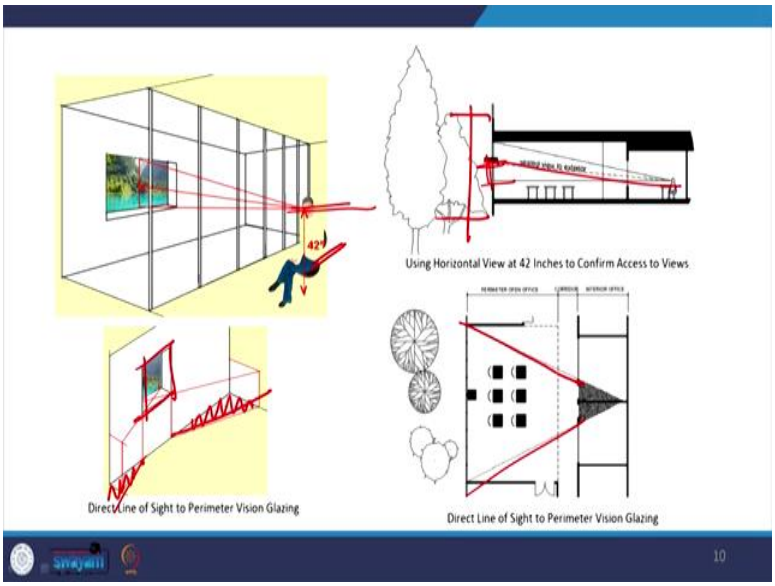

Now, this can be very simply achieved or the compliance can be shown with the help of schematic diagrams; where we have to ensure that the eye level is being considered at 42 inches height. We have to eliminate the areas which are right next to the vision glazing, which cannot possibly have the views from the vision glazing; and then ensuring that the direct line of sight is not hindered from the vision glazing.

Now, we are only considering the vision glazing part of it. So, that is between the given heights from the floor, finished floor of the building; not only in just elevation, but also in plan, we ensure that at least 40 percent of the total area of the building which is regularly being occupied has an availability of direct views to the outside.

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In addition to these outdoor views, we have to ensure that occupants well being facilities are being provided in multi occupant areas, for example large offices.

The intent is again to promote the well being of the occupants and for that the occupants where long sitting hours are there as we have been discussing, they need breakout areas, recreational facilities; for example, gymnasium or yoga or meditation or any other indoor game for that matter. So, such areas are being provided for at least 5 percent of the building occupants. So, this has become a trend and almost all large corporate offices ensure that recreational facilities are being provided within the office premises within the office buildings.

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In addition to the recreational facilities or areas, we have to ensure that dedicated dining spaces are also provided. Now providing dedicated dining spaces is not for the comfort or well being of the occupants directly; but it is to ensure that the regularly occupied working areas are not getting contaminated because of the dining in, in the work areas. So for dining, the separate dining areas are used, so that the work areas remain hygienic and clean.

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Another very important part which is not part of design, but it is part of operations in a building is purchase of green consumables. It is often found that the building is reasonably designed, it is designed rather well, good; where we have installed very good HVAC systems, we are bringing in good air, clean air, there is thermal comfort ensured, there is daylight ensured, outdoor views are ensured. But because of the daily cleaning agents, the chemicals which are used; these chemicals they have toxins and they are being inhaled by the occupants.

For example the floor is wiped every day and for wiping the floor the chemicals are added, which release fumes, which reliese toxic chemicals; we might not be aware of them, but there are a lot of chemicals which are used in these cleaning agents. For example, for floor wiping, for washing dishes and things like that. So, we have to encourage the use of green consumables in interior spaces which have low impact on human health as well as the environment and there are certifications which are available. So, to comply with this particular criteria, we have to source the green consumables which are certified either say green seal certified or there may be other certifications available in different countries.

Unfortunately as of now, we do not have in India any such certification which certifies green consumables; but we have to make an informed choice, we still have a lot of organic products which are available for cleaning and the day to day cleaning purposes in the building interiors. So, we have to select these eco friendly products which are free from toxic chemicals and they do not release any fumes.

So, we will close this particular lecture here. To conclude in the last week; in this week in the 5 lectures, we have discussed about the various aspects of indoor environment quality. We have discussed the different parameters the issues and criteria, starting from the design stage to the construction and the operations phase. And this range is to from different parts of different components of the building from macro to micro.

So, from the envelope of the building where what should be the WWR to allow for sufficient daylight inside, to relatively smaller issues like what should be the glass type. So, besides the WWR, what should be the glass which should be used, what should be the materials for the indoor surfaces which should be used to the operation issues. As to

providing the controls in the hands of occupants for thermal comfort as well as light, and to such small details such as procurement of green consumables.

When we are talking about green buildings and when I am discussing about these particular criteria and the broad heads, as I say indoor environment quality; we are limiting ourselves to the discussion around green buildings. However, if you look at it from a sustainability point of view, this discussion has no end; we have almost discussed and covered all the different aspects of green buildings, but it does not end here or it is not limited to only this.

Whatever decision is being made, whatever choice is being made; we have to consider the environmental impact of that choice and we also have to consider the impact of that choice on human health and well-being. These are the two most important criteria and the determining factors.

So, nor do we have to compromise with the human health and well-being, nor do we have to compromise with the environmental well-being, the impacts on the environment. So, besides this criteria any decision that is going to be made with regard to sustainable buildings or green buildings has to consider the impacts on environment and health and well being of occupants. So, we close the lectures of this week today. And see you in the next lecture, starting from the next week onwards.

Thank you for being with us, see you again, bye bye.