Glass in buildings : Design and Application
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Lecture – 47
National Building Code 2016

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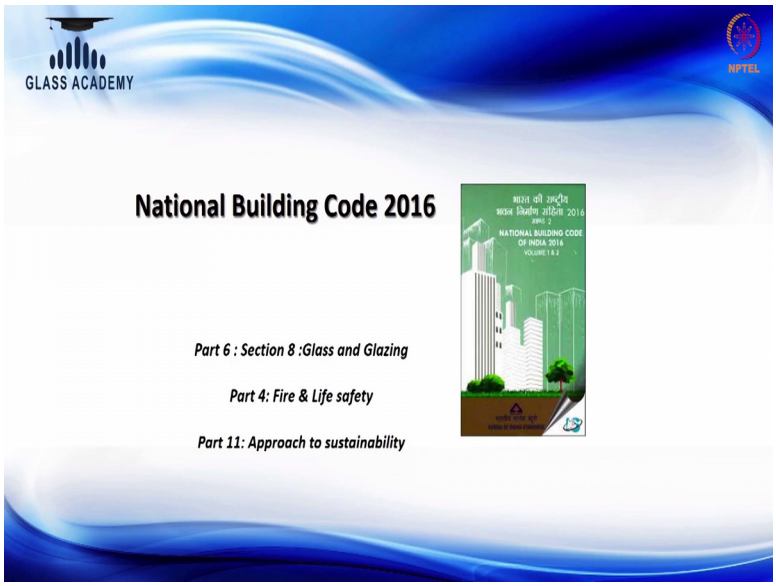

Welcome all. So, today the session will be on National Building code of India, which has launched in 2016 December. So, this is a very unique code which has been used in the industry for past 25 years and it has gone through for a very detailed revision in 2016 the detailed revision has a huge value specific to glass and glazing divisions, because there is a new section been added in part 6 which is section 8 called glass and glazings and there is some more details will be in covered in the part 11, which is approach to sustainability which glass play a very vital role. So, today's agenda for the day will be under the section 8.

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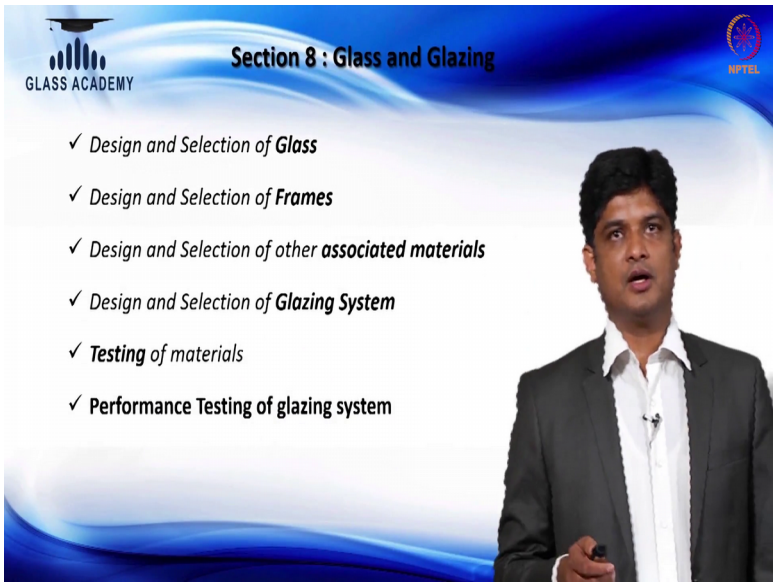

There are a lot of details being captured respect to glass its materials and its system under testing methodology we will be able to cover on specific to the class requirements. So, we will be doing something about the basic design and how the selection of glass can be done, design and selection of the frames design and selection of the associated materials. The glazing system, testing of the different materials both glass and the glazing system and how the performance testing has to be done for the glass, there is a basic content being part of the section 8, glass and glazing division to go precise into the section.

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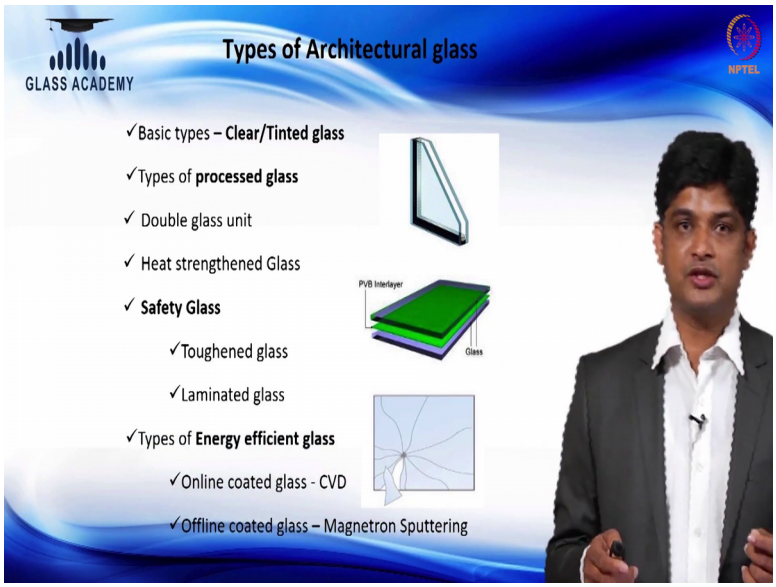

Respect to the glass it starts with a very basic introduction to the types of glass available which is the basic types, clear and the tinted glasses which we call it as a base glass. So, to do any value addition you need the base glass which is manufactured by float glass technology.

So, the base glass can be in the clear format or it can be in the tinted glass format, which we mean green, blue, bronze and grey base glasses. So, we manufacture it as per the float glass technology and this will be taken for any other high performance applications. Then the same glass after coating has to go for processing, processing we mean is how to add value to the glass on the structural side, how to improve the impact resistance of the glass from compared to the normal annealed glass to the toughened into the toughened format or to the heat strengthened format or we can do lamination or we can do double glazing.

And this code very precisely communicates about what kind of glass to be used for structural glazed application or facade or glazing in case of buildings, which we call it as safety glass. So, as per the safety glass for NBC 2016 it very clearly defines a product which has to pass through the typical testing procedures and then it pass through then it can be labelled as safety glass. To understand in a simpler format, there are then the toughened glass and the laminated glass this is the two kinds of products which can pass the safety requirements as per NBC 2016.

There are types of energy efficient glass which is used in every energy efficient buildings today or any green buildings or a building which has to comply energy conservation building code. So, in this there are two coating technology with any glass manufacturers will be having it, one is called online coating technology which we call C V D or the Chemical Vapour Deposition procedure or we the entire industry has moved from online today we all produce which is called the offline coating technology which is called Magnetron Sputtering.

So both this technology available in India, where you can get a different range of products starting from the basic selectivity products to the high end selectivity products based on the type of the building, orientation, topography your purpose of usage of the building you can window wall ratio and based on the combination of the glasses you can

select whether you want to go for an online or an offline coated glass. So, this portion section 8 which actually takes you through in detail about all this.

So, start from the base glass which is a clear and tinted, then what are the kinds of coating technology available, the online coating technology and the offline coating technology and then it takes you to the types of process glass available and then in the processed glass what we can label at, label it as a safety glass, which is ideally the toughened glass or the laminated glass.

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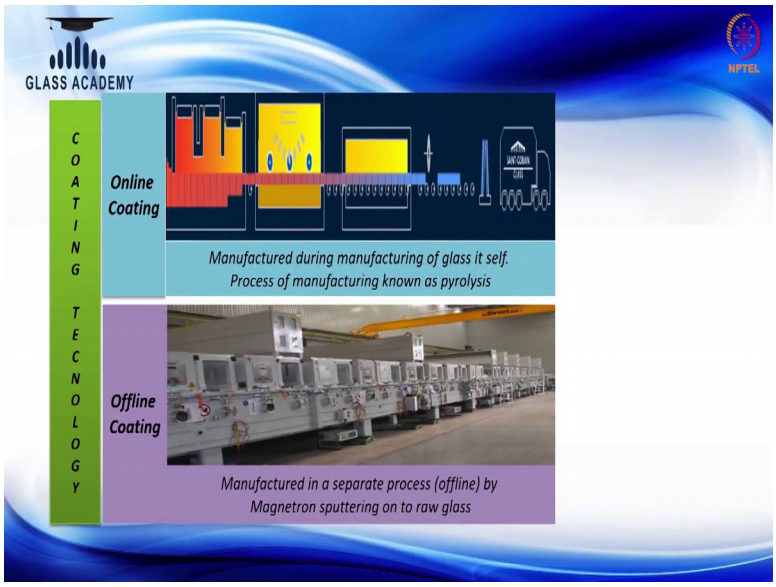

So, to take one step further how to how do we manufacture glass? So, we manufacture the base glass as per the float glass technology. So, in the image we can see the online coated technology cross section, where ideally I have a furnace then I have a float bath and then I have a annealing layer. So, the same technology in the during a same glass manufacturing process I do the coating when the glass is on the line ideally that is why the technology itself called as online. So, when I do this process that is called an Online Coating technology. The detailed procedure about the online coating process will be covered separately in the manufacturing process, similarly the second one below.

Which is called Offline Coating technology as the name indicates of the line I produce a base glass separately in a way float process, then I have to store the glass separately which is we precisely going to be used for this kind of a coating which is called magnetron sputtering. So, then I will have a different chambers with a different target

materials to be deposited on the surface of the glass, why we need different target material because there is lot of performance to be achieved whether it can be light transmission solar factor U value or external reflection or the internal reflection. So, I have to play with the 5 different parameters.

So, we select different materials which can play with a different performance of the glass. So, this is called offline coated technology. So, again in detail about the precise temperatures and the conditions of the chamber, the technology began we will be covering in the manufacturing procedure.

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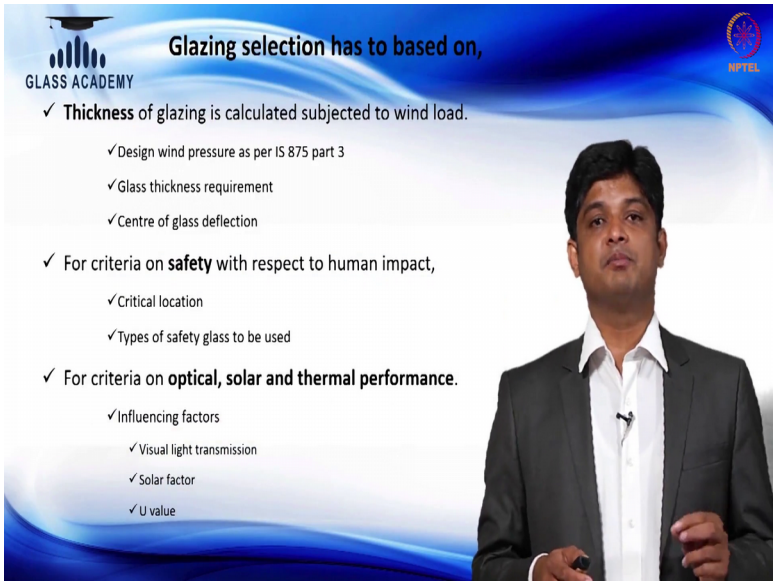

So, as per NBC 2016 it is very clear, it suggesting a very simple methodology how to select glass for any building. So, it says we have to select the glass for thickness which is to be calculated or subjected to the actual wind load as per the new IS 875, which has different parameters to calculate based on the type of the building, Height of the building or the location of the building or even we have added a new parameter to consider the local wind impacts.

So, once you calculate the IS 875 wind speed we have to now calculate the glass thickness requirement for the concerned glass combination or for the panel size that has been selector or identified. Once this is being done then the same has to be checked whether is a glass is a safety glass, which can withstand the human impact because the

glass the facade which is 99 percent of the project which is accessible for the end user to touch or feel the glass. So, when there is an access to touch the glass.

Then ideally it has to be a safety glass which has to withstand a higher impact resistant. So, based on the kind of a location, what kind of product has to be used and what kind of test it has to pass through? That is been very clearly noticed or it been identified in your n b c 2016. Then the third parameter is how do i can make the glass more energy efficient? What are the key parameters in the glass to select or to make the building more energy efficient? So, three basic performance drivers are visual light transmission, solar factor and U value. So, in depth there is a proper definition for this been given in the NBC to brief you.

Visual light transmission is a percentage of light transmission happens through the glass from outside environment to inside environment or from the source to inside the building. When I say solar factor it is the percentage of direct heat transfer happens from outside environment to inside environment. So, India is a country we have higher amount of heat and light. So, there is a tendency of light transferring through the glass, similarly there is a possibility of direct heat transmission happens into the building. U value which is the third important parameter which is ideally the heat transfer transformation happens between two difference in climatic condition.

Say for my today the outside environmental conditions are above 40 my inside said temperatures are below 25. So, there is a difference of 15 degrees which is called the delta t. So, there is a possibility of heat transfer from higher temperature to a lower temperature. So, the parameter which defined in the glass to understand this phenomenon is called U value. So, visual light transmission, solar factor, U value these are three important parameters, that anybody has to be very clear on the understanding of this parameters to select a glass for a building, to take you through an example, normal clear glass which is 6 7 thick float clear glass which will be having an higher light transmission which is at 89 percent.

Solar factor which is 0.83 to 85 which is 83 percent to 85 percent of the heat will be coming in to your building, U value, which is 5.7 which is the property of the material. So, I will take you through what is ideal value that you should be able to select it for your buildings in the session towards the session.

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