Glass Processing Technology
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Lecture – 41
Insulating Glass Unit Part VIII

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Let us move on desiccant. So, having said that so, desiccant has widely you know powerful tool in order to prevent the moisture what are the moisture trapped inside the DGU, It will absorb that is the most important. And it will allow the occupant to see outside because they will not have any condensation. If any the temperature difference like it is heavy shower fall like torrential rain outside where inside you know sometimes like you will get the because of the temperature difference of the of the pane you will have the foggy effect. So, because of the desiccant it will not allow your IG to get into the foggy effects. So, this will prevent for condensation basically of fogging effect.

So, the desiccant is play vital major role in terms of IG process. You can see this at the bottom, you can see there is a filled desiccant as the nature if you know same colour once it is absorbed you will be actually I identify as a blue colour being to differentiate it will absorb like hydrocarbons water vapour inside. So, this is how it is you know keep on gradually it absorb and the durability what the manufacturer says it the manufacturer – manufacturer differs probably the 10 years if you keep it in a air tight container when

you get it into the great affect you can get out of a desiccant.

So, having said that desiccant were introduced to remove the moisture trapped inside the IG unit some of the desiccant absorb not only the water also the inert gases between the panes. So, that would result in lower thermal performance. So, whatever we select the desiccant should not absorb any inert gases thermal performance gases we should know. So, when at the time of purchase we should be in keep in mind that the desiccant should not absorb the inert gases. So, that is that is first most prime job for us to finalize the vendor that is the first most.

And, it should able to absorb water and hydrocarbons that is the nature of the desiccant it does the job, but it should be you know it has to be you know noted and it should not absorb the thermal performance gases which having said that the like argon xenon krypton those gases. And it should not contain pre-absorb nitrogen. If it is already pre-absorb nitrogen is there thermal performance will be very less the durability of a desiccant will be very less.

So, the selection of a desiccant also these are the factors you need to be considered at the time of selection of a desiccant of finalizing the vendor. And, basically molecular sieve size in normal pore diameter is 3 Armstrong which expressed in terms of you know identify the desiccant diameter 3 Armstrong. And, it has alumina silicate as a base and potassium as the catalyst I mean cation. So, that is a base of material which you know which help us to prevent the condensation.

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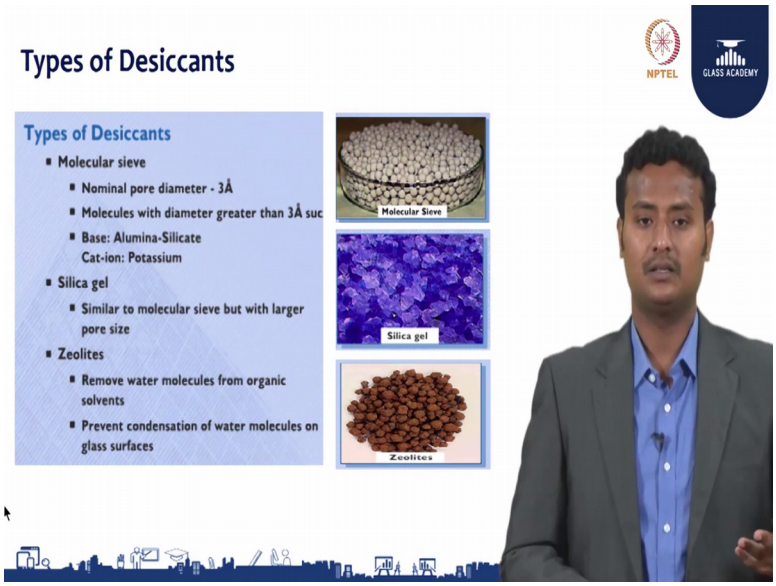

Next we will discuss about types of desiccant. This is the molecular sieve which is widely used, this is silica gel the same as good as molecular sieve, but this is the because of the pore sizes are larger in size. So, nowadays people not using it, mean it is it was obsolete not presently also it is obsolete, there is no availability of silica gel right now. And, zeolite it was once upon time was used this also kind of desiccant again this also obsolete.

So, which having said that earlier it has a 3 Armstrong like in the diameter and the base alumina silicate and potassium as a cation, it is a mixture of those you can get this molecular sieve silica gel similar to molecular sieve, but it with the larger pore size. And, zeolite remove water molecular from the organic solvent and prevent condensation of the water molecular on the glass surfaces. So, three types of a desiccant which we discussed out of which molecular sieve the first one which is a prime function which widely used in the world.

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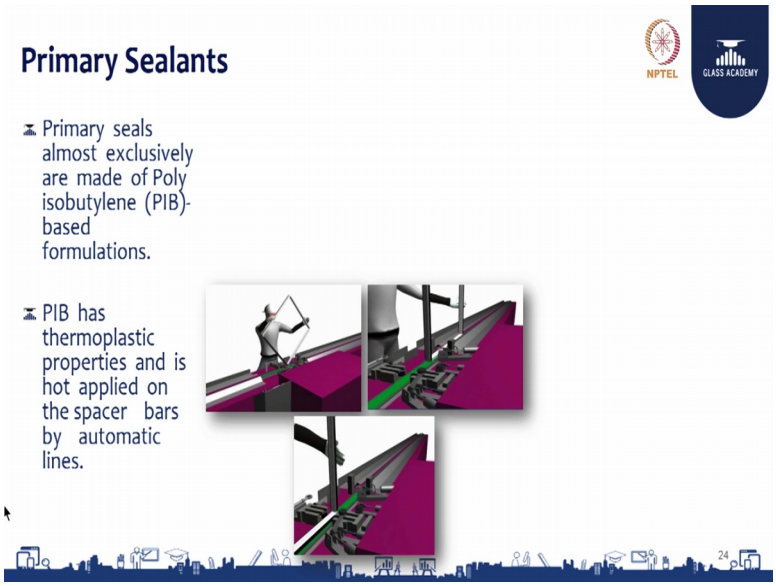

Let us discuss about the primary silicone primary seals like silicones are used extensively like exclusive are made of poly isobutylene which is mean PIB which is called polyisobutylene based on formulations it is made it. And, PIB polyisobutylene has a thermoplastic and properties it can be applied on hot applied through this spacer bars by automatic lines with the butyl extrusion machine it will be widely used for dispensing this primary silicone.

So, this is the picture. So, this is a separate machine it is primary silicone extrusion machine which has a two nozzle, where the two nozzle through which the primary silicone which dispensing on the spacer the spacer has the two sides. So, in a one in a single stroke the you know both side will be applied. So, it will be uniformly applied. So, this is all the work is happening on the primary silicone on the surface of the aluminium channel.

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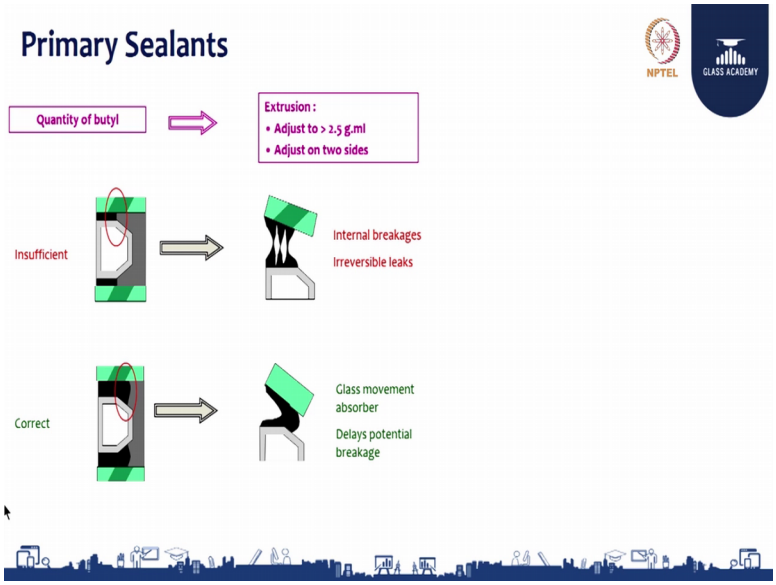

And, in quantity of a butyl extrusion like if anything is there adjust to 2.5 grams per milli and adjusted in two sides like you can adjust it. So, you can see here this is the insufficient. So, there is you know lack of you can see there is a red colour identify, there is a lack of a silicone primary silicone has been filled with it. So, will be a loss.

For example internal breakages and irreversible breakages. For example, if we use like this having said that here the butyl nature it will it blocks this water vapour tightness I mean it prevent the water vapour gets into the DGU, as well as it is suppose a mechanical load like a wind load when it hits on the facade or the glass. So, the if the due to the wind load the glass may deflect. In order to deflection to get this load in like a systematic load like the flexible load so, this butyl will help us in order to prevent that you know glass breakage at the time of wind load. So, we will have to be carefully we have to filled with the primary silicone.

You can see this primary silicone has been filled properly which is slight excessive because it will allow you know the slide like 2.5 milligram it if we use excess of material extrusion on this edges. So, it will allow for example, can see the picture it will allow. So, the glass movement absorber if that the glass is starts moving it due to the high wind load applications. So, it will absorb that glass movement and delay potential breakages, it would not.

So, if the less silicone primary silicone will have a you know whereas, the second picture

which I correct picture which I showed you, this is how you know primary silicone has to be filled on the I mean extruded on the aluminium chain.

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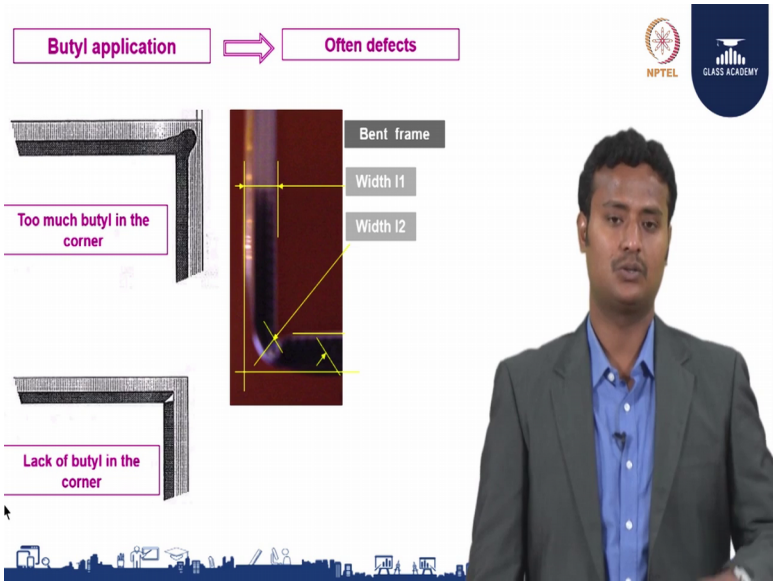

Butyl application often defects. So, sometimes too much butyl in the corners, so, corners has to be you know we have to be very careful. If it is less or too much either will be a problem, so, it has to be very uniform. So, you can see this is the bent frame. So, we will have a problem. So, you see that other left hand side and right inside. So, there will be difference of primary silicone we will have a different effect. So, it has to be throughout the edges it has to be uniform.

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Let us move on to this type of IGU sealant. This is a single part; this is a two part silicone. So, basically primary silicone which is PIB polyisobutylene which is a single part which is primary silicone next is a double side I mean two parts which is silicone or hot melt. So, it will be a two part silicone. So, primary sealant is a PIB which is the polyisobutylene or butyl it is called and secondary sealant is silicone or poly sulphide it is like one part and two part components.

In case of a two part sealant the mixing ratio of like base A and catalyst B should be the consistent. Throughout the consistent because you should not mix like the base you whatever you take it as a black should be one tenth of a white of catalyst. So, that is the consistent we have to meet it otherwise we will have a lot of effect like miss colour match and durability, share enough problems would come. So, it has to be mixing is should be a consistent. So, based on the experience you will get a experience you know expertise on this mixing.

So, you will have to thoroughly you will have to go through the guidelines of the manufacturer like silicone manufacture whatever there has been informed. So, we have to strictly follow. So, if you mess, if you if you are not doing the proper mixing the entire process whatever. So, far you have done this pre processing tempering framing desiccant filling. So, the silicone mixing is not proper so, you are allowing your DGU is get failed at the earliest. So, this is that last function, but not least, you will have to take care at the

time of mixing.

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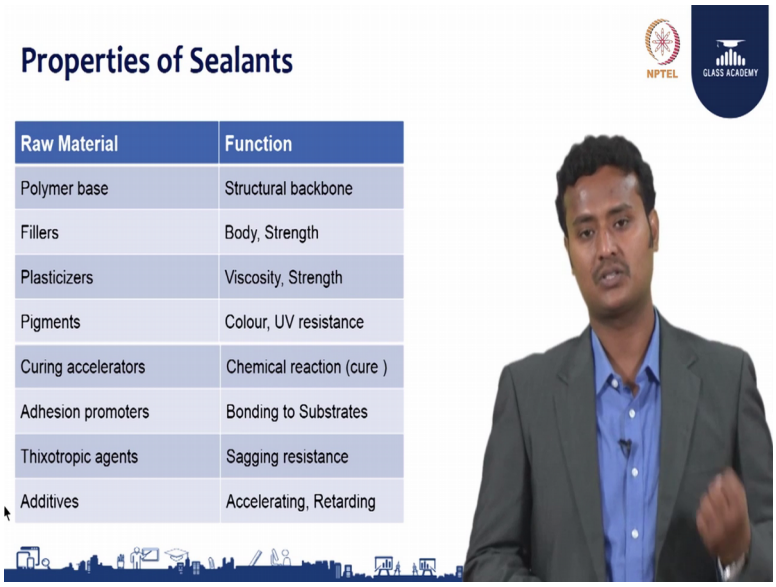

Next is properties of silicone, let us see about it. Like raw material I distinguish between raw material and what is function. For example, it is a polymer base like it is structural backbone like it will give a structural strength basically every IGU should have the structural strength. So, if the structural strength is not there the glass will you know will fall from any moment. For example, if it is a skyscraper or a big storey building if you use as a facade the structurally, if it is not strong it is not help properly it will fall off. So, it will be a big massive, it will be a lot of a problem for occupant not only the outside or inside it will be a problem for everybody. So, it be a structurally it is a backbone.

So, it is a polymer based and fillers it is a body and strength it will give a like lot of strength inside and plasticiser like it plasticiser help us in viscosity and strength. And, pigments as you all know about it pigments will does a colour effect. And, UV resistance; UV resistance most important because these structural silicone has been used for outside like weathering a structure silicone we have expose to the heat and moisture are chemical fumes or cleaning agents. In order to prevent those abnormalities to come and affect or hit the silicone you will have to have a proper strength. So, thereby the UV because when it the sun is there will be a ultraviolet radiation would be there. So, in order to protect that one if it is not protected will be your silicone would become a colour change from presently it be a black, it may be a white or yellowish after that.

And, curing accelerator chemical reaction cure; so, the curing accelerator is most important because it is not DGU process. Today you apply you should not wait for a week to cure because you will have to serve the customer in a immediate effect. So, that is why in a hour or maximum 4 hours is sufficient enough to dispatch your DGU. So, that is the curing accelerator will help you to dispatch the faster. So, the silicone should have the proper curing accelerator.

Adhesion promoters, the bonding substrates the adhesion promoters it is massive. Again this is one of the best quality out of silicone, if this fail you do not have a adhesion then will be a problem for everything. So, that is the best thing has in silicone on adhesion promoters. Bonding to the substrates therefore, example aluminium or from glass to other surfaces you know when the glazing it. So, it require. So, there is here we are emphasising here is a silicone the glass and aluminium substrate.

Thixotropic agent which means sagging residence which I told you if you are doing on the vertical glazing you do not have a problem if you have a horizontal, you will have a problem even then this has a agent. So, it will prevent that sagging effect, so, it will give a structural you know flexibility. So, again additives it will accelerating I mean retarding. So, these are the chemical properties.

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And, let see having said that. So, our silicone there are two types; one is organic and inorganic organic which is classified as a polysulphide and a polyurethane whereas, in

inorganic is classified as silicone and hot melt. So, I have been distinguished with the colours like you can see this properties, there is yellow you can see this polysulphide which needs all the requirements. For example, elasticity, stress relaxation, shrinkage after cure and argon transmission rate.

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So, in polysulphide if you take it as a organic as a polysulphide, a polysulphide has excellent chemical resistance, adhesion good for all the organic inorganic and shore hardness is almost all the organic inorganic silicone. So, satisfies. So, this is the secondary silicone properties.

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Next let us look at it function of secondary silicone structural bond glass pane and spacer. Basically, provides structural benefit towards glass pane and protection of gas filled spaces fill from influences like moisture vapour penetrations, chemical attack like cleaning fluids, glazing products. So, it will prevent that one and liquid water penetrations, rain condensation and it has a low moisture vapour transmission and gas diffusion rates. And, adhesion glass spacer I mean adhesion to the glass and spacer substrate has massive for this and it has a long durability because of the nature of the silicone what we selected and provide good tensile and shear strength to the glass edge and spacer.

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