Glass Processing Technology
Prof. Somnath
Department of Civil Engineering
Indian Institute of Technology, Madras

Lecture - 36
Insulating Glass Unit

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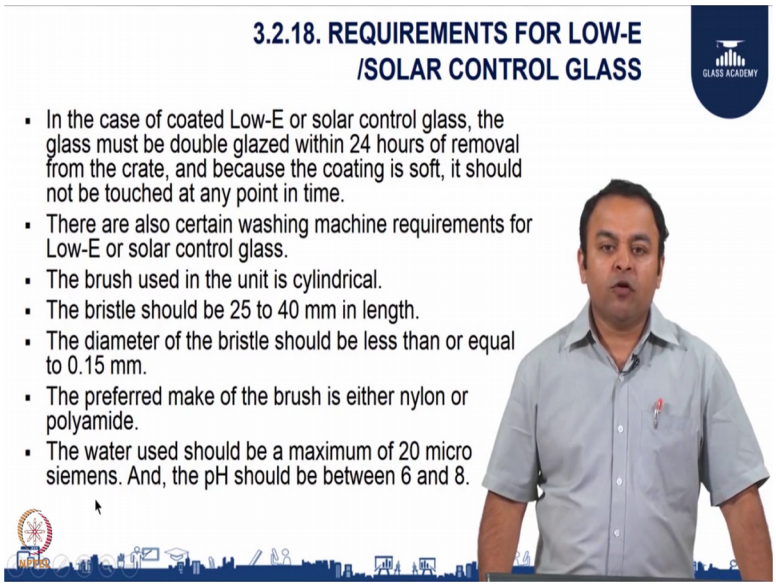

Let us come to the requirement of Low-E and the solar control glass. In case of Low-E you know you have a multiple layers of silver as a coating layer ok. So, the edge relation becomes a very essential, and there are also special requirement of the washing machine for Low-E. A glass the brush used in the unit is always cylindrical, and the bristle should be 25 to 40 mm in length. And the diameter of the bristle should be less than or equal to 0.51 millimetre. You can either have very fine nylon or you can have polyamide. The most important thing is a water quality which has to be less than 20 micro siemens. And the pH always has to be between 6 to 8.

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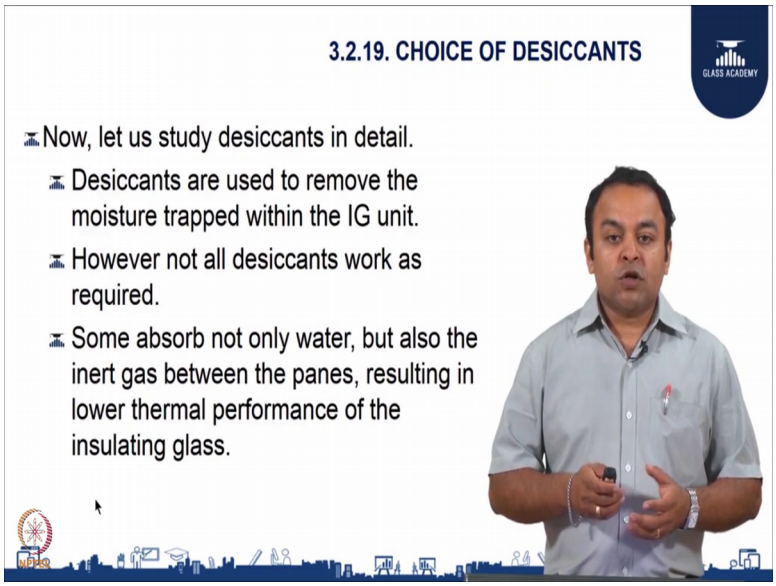

Now, let us come to the choice of desiccants. Normally, the desiccants which are use is 3 angstrom. Some absorb only the water, but also the inert gas between the panes resulting in lower thermal performance of the insulating glass.

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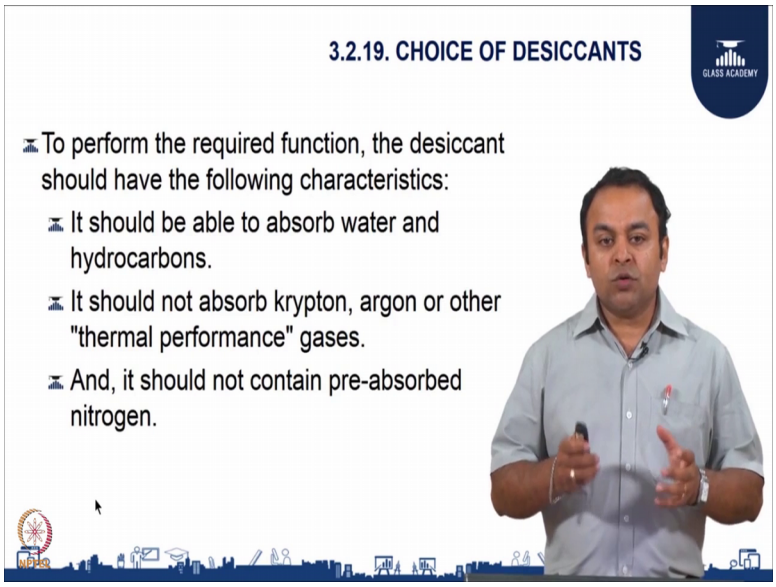

The desiccants should have a property to absorb water as well as hydrocarbons. It should not absorb the inert gas and other the thermal performance of gases. It should not contain any pre absorbed nitrogen.

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Though the picture you can see that is of the zeolite.

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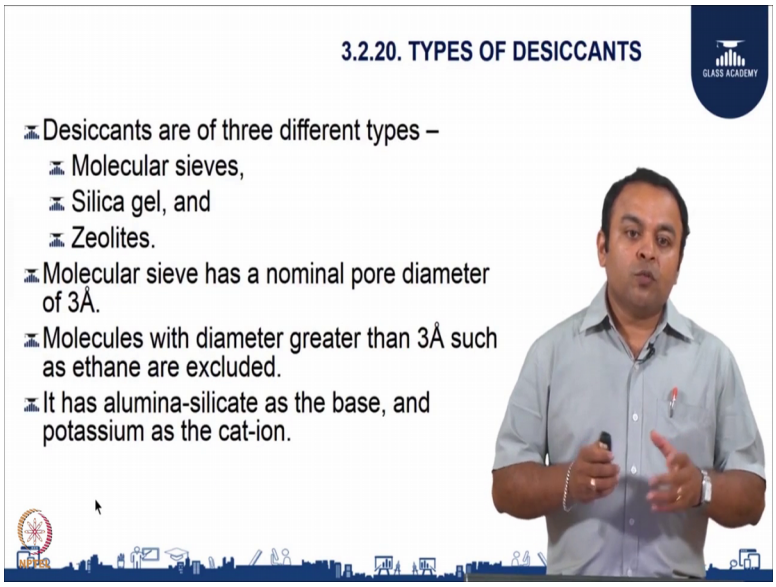

That is the most commonly used. You also have something called silica gel which is not recommended ok. Desiccants are of 3 types. One is the molecular sieve silica gel and the zeolite.

Molecular sieve has a nominal pore diameter of 3 angstrom. The molecule with diameter greater than 3 angstrom such as ethane is excluded.

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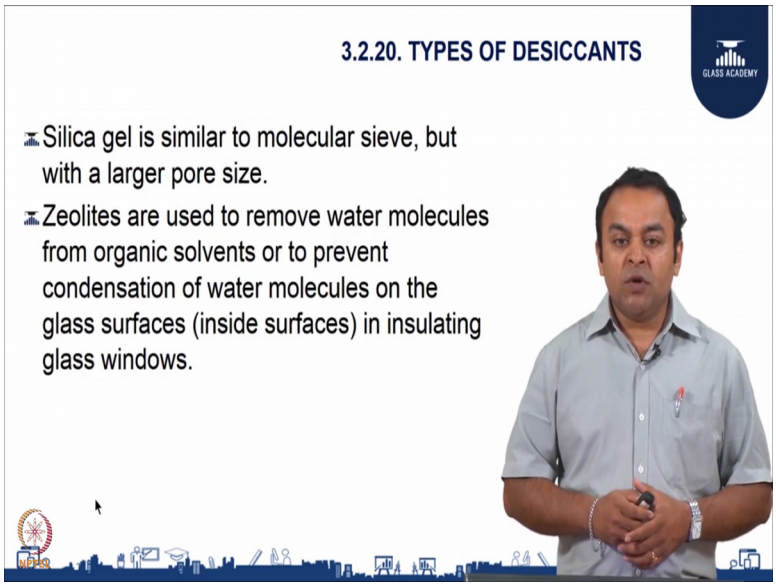

Silica gel is similar to molecular sieve, but with a large pore. Zeolites are also used to remove water molecules from organic solvents, or to prevent condensation of water molecules on the glass surface in insulating glass windows.

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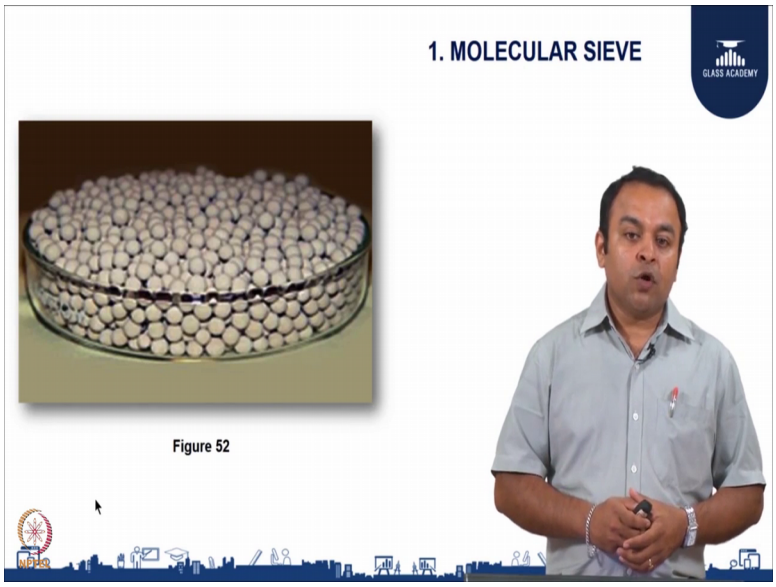

This is a typical molecular sieve something of silica gel and this is zeolite.

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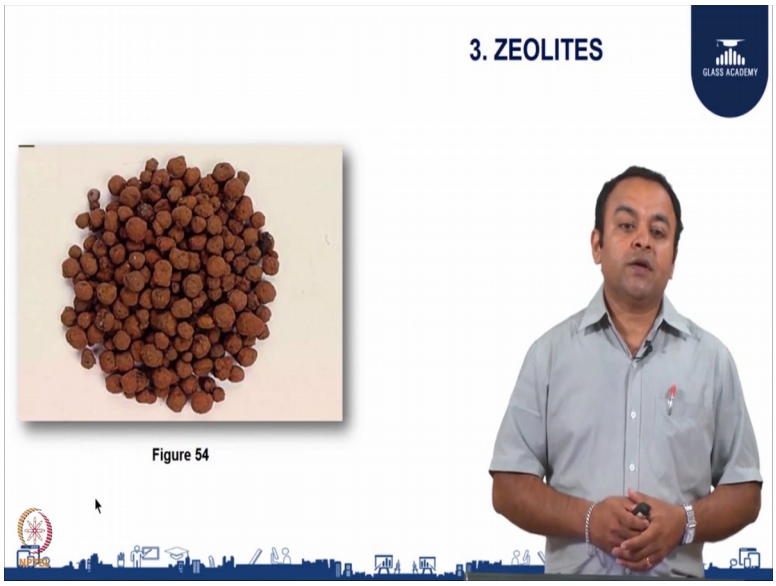

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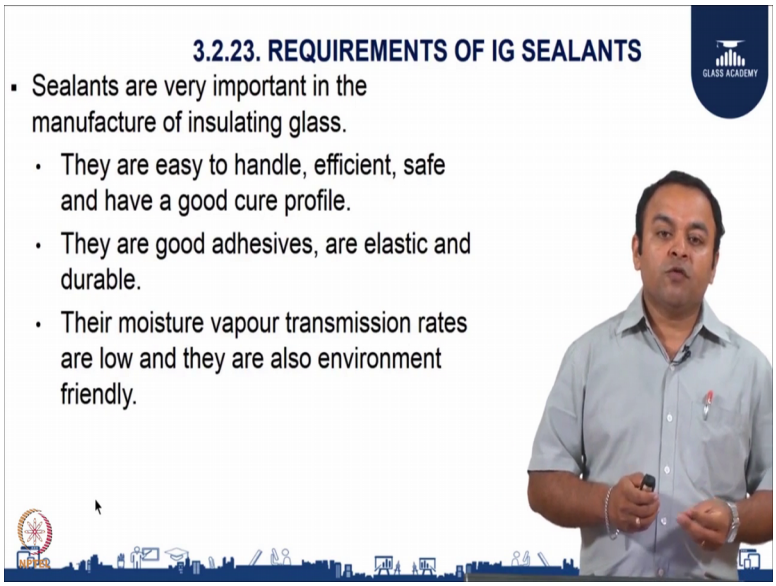

Now comes the requirement of the IG sealants. Sealants are very important in the manufacturing of IG sealants. They are very easy to handle efficient, safe and have a good cure profile. They are good adhesives and are elastic and durable. The moisture vapour transmission rates are low and they are environmental friendly.

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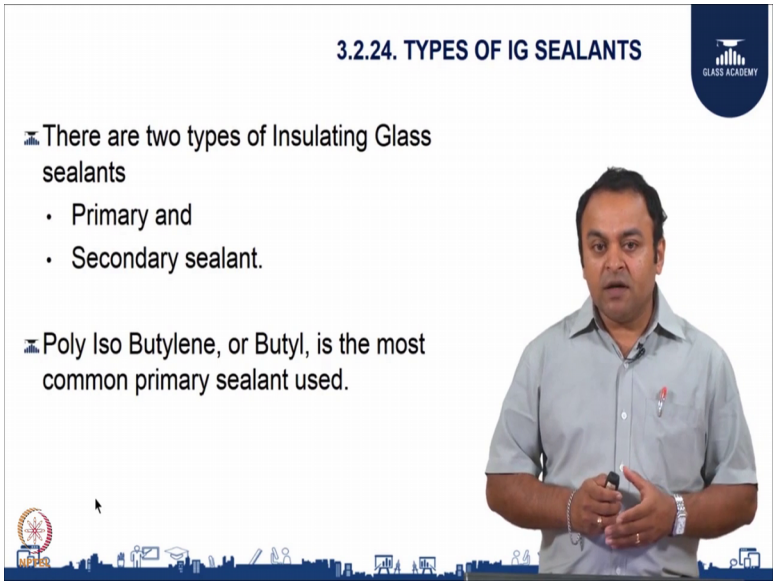

You have a primary sealant has well as the secondary sealant. Primary sealant is also called as Butyl or Poly Iso Butylene.

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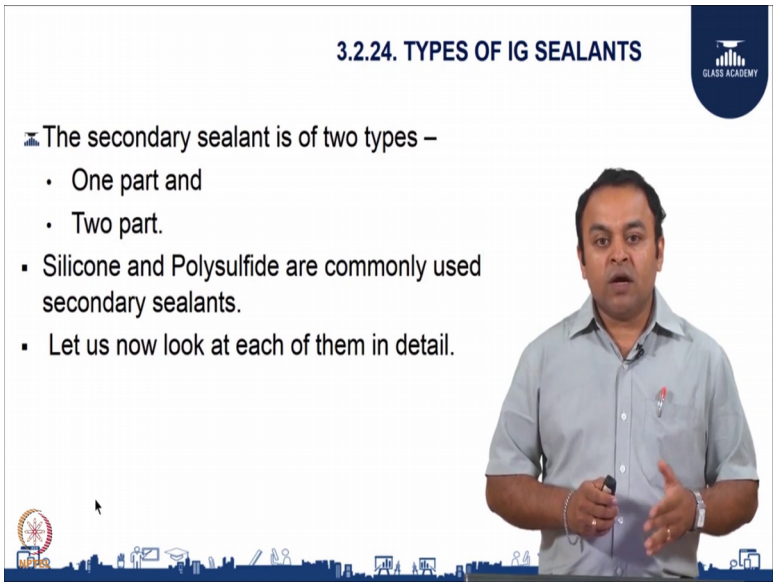

And the secondary sealant you are having 2 types, one is a 1-part and you have a 2-part. You also have silicone and polysulfide as the 2-3 varieties which is used.

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This is a typical 1-part sealant.

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And this is a 2-part sealant.

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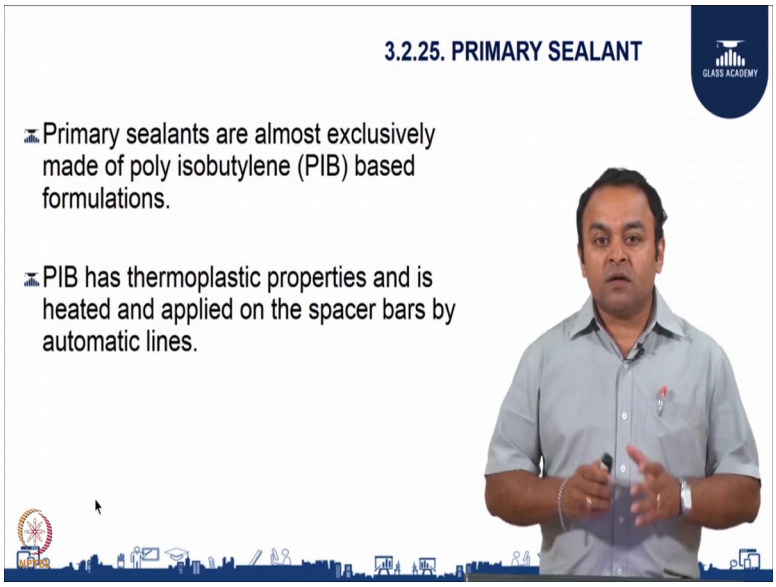

Primary sealant are almost exclusively made of poly isobutylene. Thermoplastic properties and here heated and applied on the spacer bars by automatic lines.

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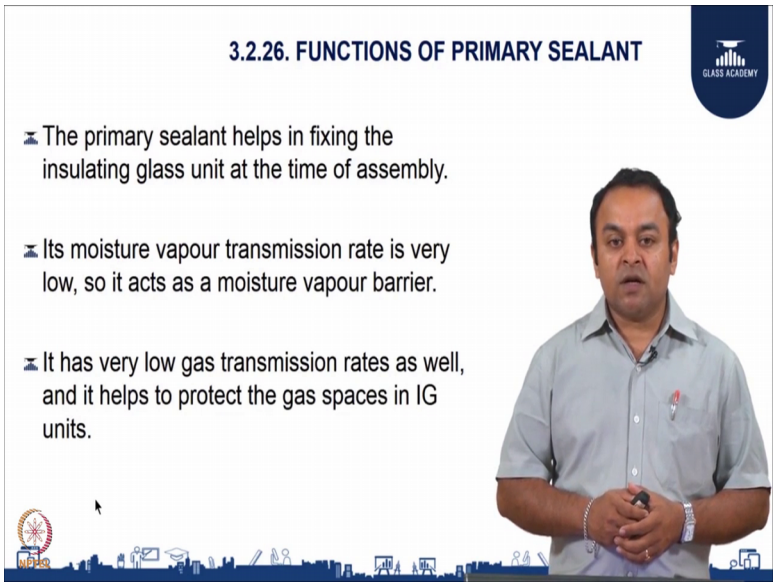

The primary sealant helps in fixing the insulated glass unit at the time of assembly. It is moisture vapour transmission rate is very low so, it acts as a moisture vapour barrier. It has very low gas transmission rates as well. And it helps to protect the gas spaces in IG unit.

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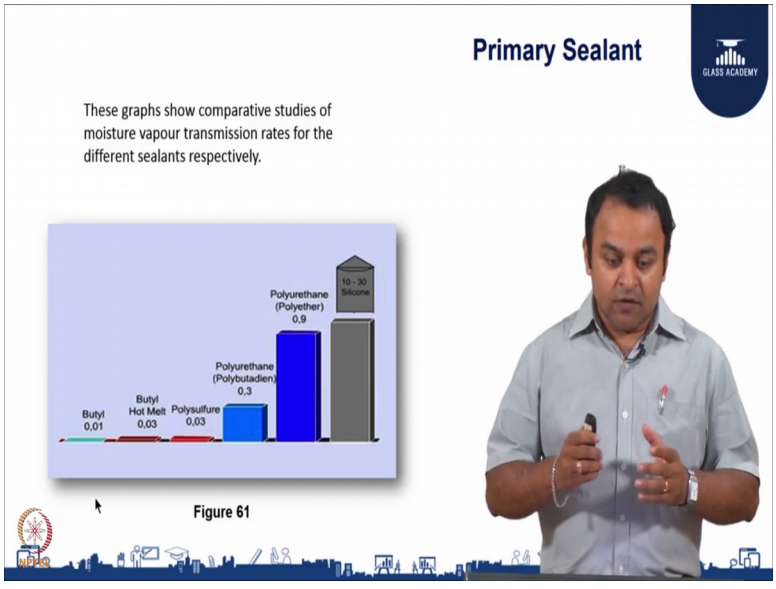

If you see the graph, silicon has got the maximum moisture vapour transmission rates while butyl as got the least from the list.

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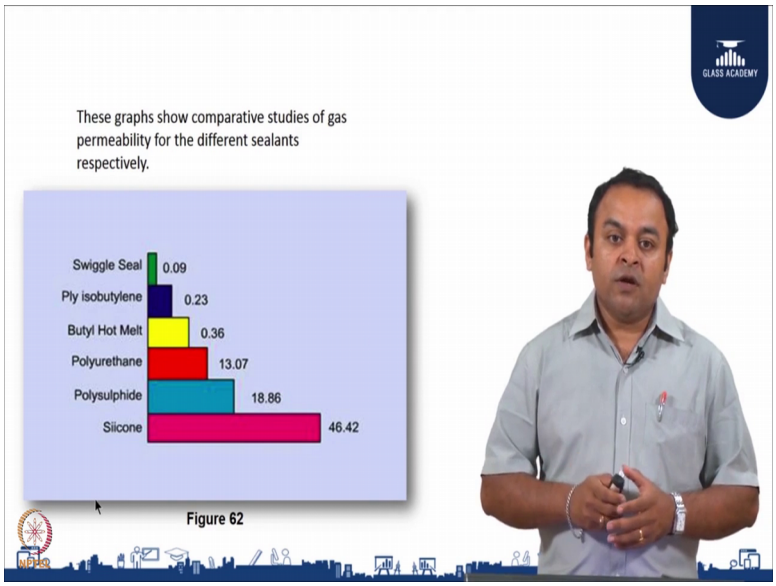

This compares the study made for gas permeability for different types of sealants. You have the butyls, you have the polysulphide, you have the silicones. Silicone is the most bad for using for gas this thing. And polysulphide is having much better property than a silicone. When you have the gas filled inside the DGU.

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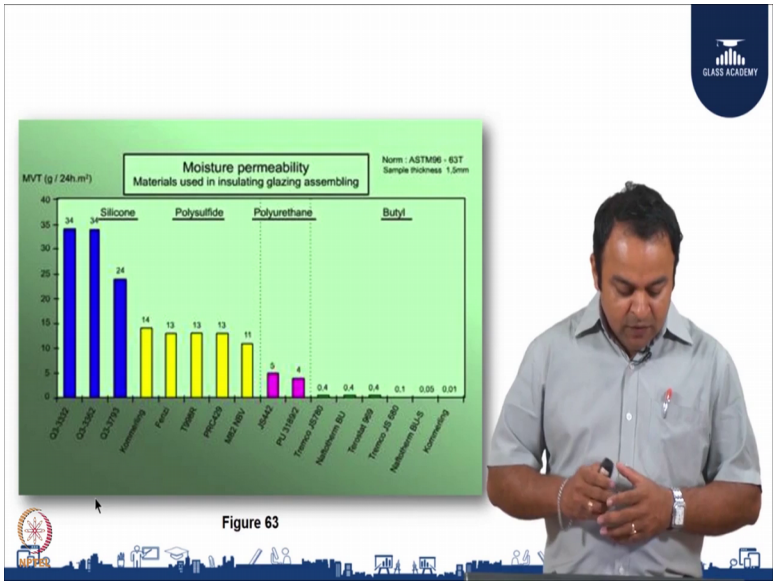

And this graph it shows different varieties of sealant as well as the polysulphides and polyurethanes. You can see the moisture permeability from this graph.

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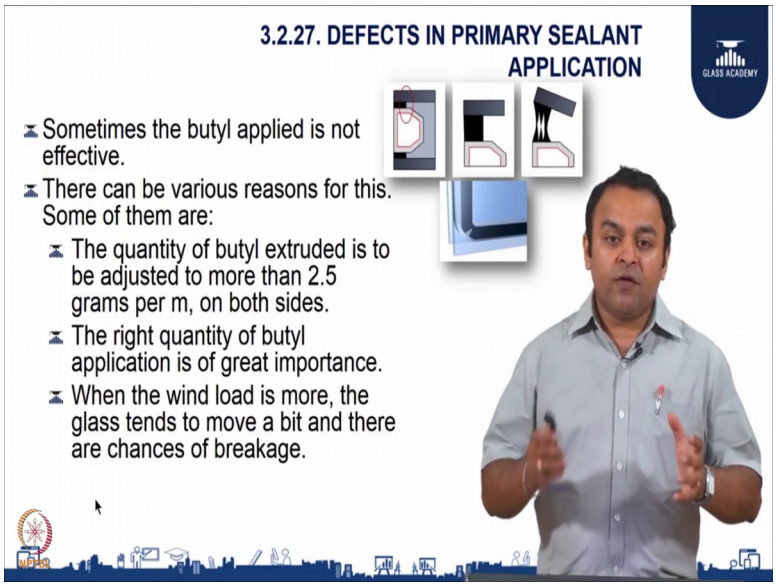

Now, let us come to the defects of a IGU. The quantity of butyl extruded is to be adjusted to be more than 2.5 grams per meter on both the sides of the aluminium spacer. The right quantity of butyl application is of great importance; when the wind load is more, the glass tends to be moving a bit and there are chances of breakage. So, that is taken care by the primary sealant.

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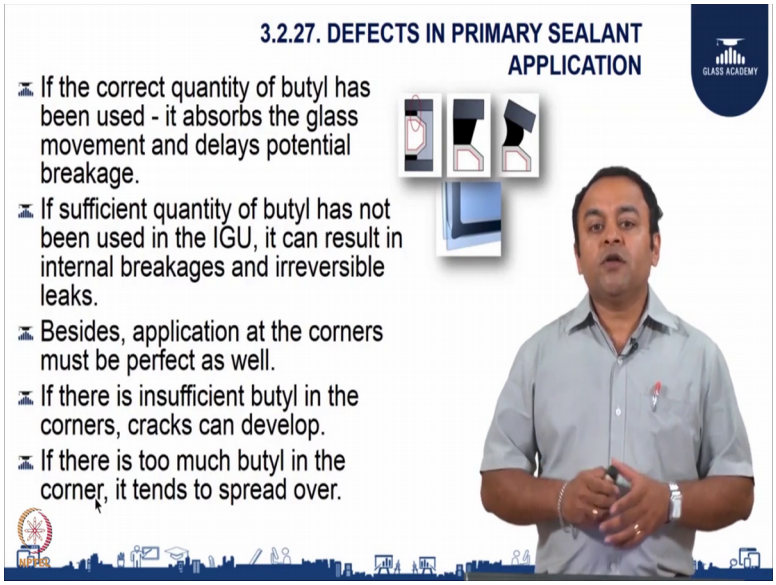

If the correct quantity of butyl has been used, it absorbs the glass movement and delays potential breakage. If sufficient quantity of butyl has not been used in the IGU it can

result in internal breakage and irreversible leaks. Besides application of the corners must be perfect as well. If there is insufficient butyl in the corners cracks can develop. And if there are too much butyl in the corner it tends to spread over.

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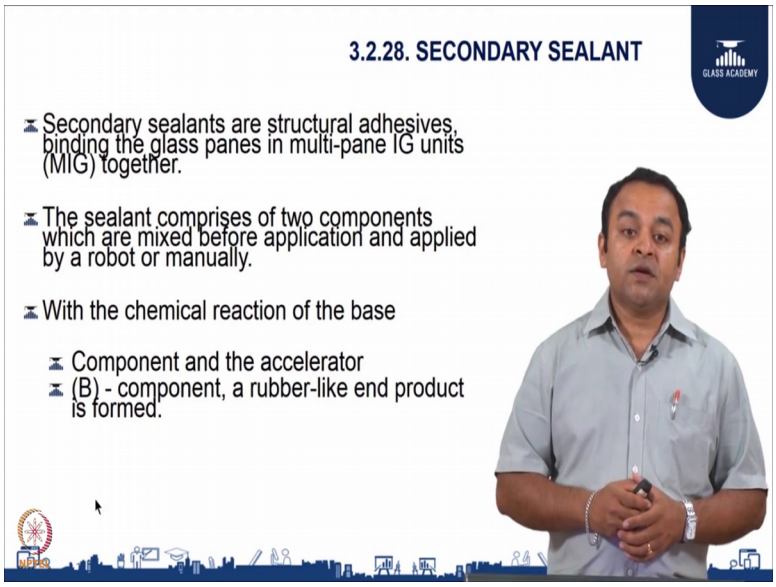

Now, let us see the secondary sealants defects.

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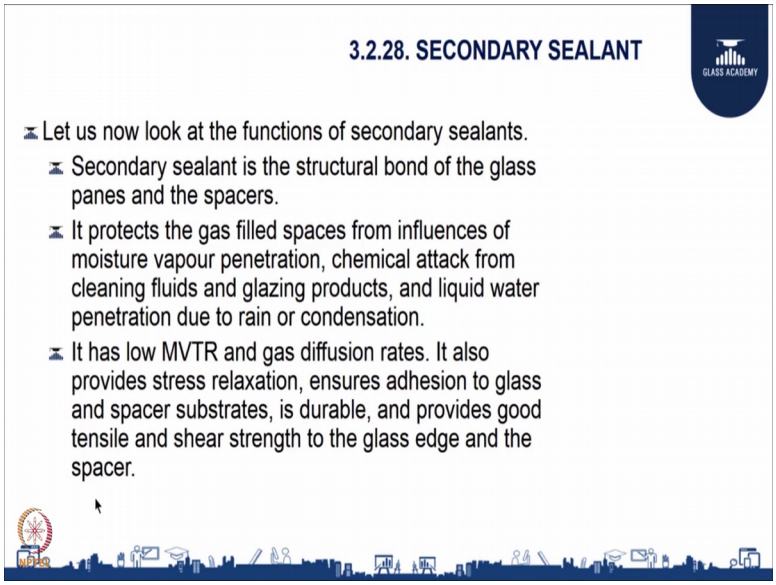

Let us now look at the functions of secondary sealant. Secondary sealant is the structural bond of the glass panes and the spacers. It protects the gas filled spaces from the influence of moisture vapour penetration, chemical attack cleaning fluids and glazing

products and the liquid penetration due to rain or condensation. It has low MVTR and gas diffusion rates.

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There are basic differences between the 1-part and the 2-part sealant. 1-part products are used in the niche applications, but the curing time is generally too long for fast delivery of the finished IG unit. It takes several days in case of 2-part IG sealants. The curing time is between 1 to 4 after application.

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