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Clariti

LET'S TALK GLASS

Dear Readers,

Picking up from where we left off with the first issue of Clariti – the AIS magazine, I am excited to rekindle our conversation. In this issue, we highlight some of the pressing issues in architecture such as fire safety.

With advancements in technology and processing methods, glass has evolved from being a building material to an architectural approach. Eco-friendly buildings are using glass as a means to both reduce electricity consumption, preventing wastage apart from improving aesthetics.

The cover story Glass and Fire Safety explores the myths around fire safety and how glass can really help in keeping buildings safe during fires, as well as preventing fires. The case study explores the different benefits of glazing and its application in helping cut costs as well as getting a suave look and feel.

See what this issue's Eye Catcher beholds. A hint – it showcases the functional and elegant application of AIS Glass.

Continuing with advancements in glass technology, we also have seen glass going from material to device and jumping on to the "smart" bandwagon with smart glass. This issue also marks the launch of AIS Swytchglas – the smart glass range from AIS that combines the quality and trustworthiness of AIS and the next generation of technology.

Bringing out the last issue of Clariti was a delight and the current one is no exception. We look forward to hearing your views, questions and what you'd like to see in Clariti as we continue this conversation in the days, weeks and months to come.

Happy Reading!

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Glass – It's clearly safe

It is best to look at facts and get a clear perspective before passing a judgement on the competency of glass to fight fire

Glass is an integral part of modern architecture and interior design. A versatile and sustainable material, glass – used for façades, windows or in interiors – gives buildings and homes structural stability, aesthetic appeal and a contemporary look, while helping save energy and costs.

There has been some debate about safety in the use of glass in general, and in the case of fire in particular. Glass façades have been held responsible for aggravating fire accidents and their consequences in buildings. However, nothing could be further from the truth. When proper norms and guidelines are followed for designing and constructing glass buildings, and the right types of glasses are used for façades, the destructive effects of fire are greatly reduced.

Fire safety – An all-round affair

The right knowledge and a broader perspective can help us make the correct judgement of the role of glass in case of fire. In this regard, let us understand some related aspects and issues.

Anatomy and physiology of a building

Firstly, there are numerous factors that determine a building's susceptibility to fire. These include: the type and size of the building, its construction method, the flammability of construction materials, the interior design, type of occupancy, the building's age and the fire prevention and safety arrangements.

Fire Safety Engineering

In international building design, fire safety engineering plays a very important role. It uses scientific principles to understand fire and human behaviour in fire incidents, thereby helping in safeguarding people, property and the environment from destruction. It involves the following aspects:

- Assessment of fire hazards and their impact areas
- Effective building design and construction
- Determining optimum fire prevention and safety measures
- Design, installation and maintenance of fire-detection systems
- Appropriate equipment and manpower for fire-fighting and rescue operations

Fire protection systems

Fire and Smoke Protection Systems should be adopted while designing buildings. Passive Fire Protection is an important part of the fire safety strategy of any building. These work by creating a barrier, limiting spreading of fire, smoke and heat, protecting escape routes and the building's critical structural components. Examples of PFP include fire doors, fire-resistant glass walls/floors/façades, fire-resistant sprayed coatings on structural steel, smoke control extract ductwork, fire-stopping penetration seals, etc. These do not provide a complete solution but are intended to work in conjunction with Active Fire Preventive Systems like fire alarms, smoke detection, sprinkler systems, extinguishers and Exiting Systems like fire exits, fire lifts, refuge balconies, etc.

There should be openings for doors, windows, structural and HVAC penetrations. A window-like opening should be provided on each floor of the building.

For doors, windows and other openings, some of the regulated and approved protectives are:

TYPES OF REGULATED OPENING PROTECTIVES		
Rated Doors	**Rated Windows**	**Rated Glazing**
Access doors	Casement windows	Clear ceramics
Accordion/folding doors	Double hung windows	Insulated glass
Bi-parting doors	Glass Block	Laminated glass
Conveying system doors	Hinged windows	Light diffusing plastic
Chute doors	Pivot windows	Light transmitting plastic
Dutch doors	Side lights	Fire-rated Glazing
Floor fire doors	Stationary windows	Tempered glass
Hoist-way doors	Tilting windows	Transparent ceramics
Horizontal doors	Transom windows	Wire glass

Glass – See what's safe

Internationally today, there are excellent alternatives available for clear vision safety glass. These include high-performance products like transparent glasses with intumescent layers, special coatings and laminates. They have also opened up new avenues for architectural creativity, as they are transparent products, look aesthetically appealing and integrate well with the other glass products used in the interiors. These solutions are safe, impact resistant and provide clear vision fireproof glazing that has test evidences of satisfying functional and time requirements for fire proofing. Tempered/toughened glass, laminated glass, insulated glass units and wire mesh glass are also good fire retardants.

In fact, today, there are products that can actually substitute a brick wall in terms of fire-rating property, yet give transparency. While some of the fire safety glasses function as a physical barrier preventing spread of fire and smoke, certain advanced solutions can actually drastically reduce the radiant heat from a fire.

The European classification standards (EN 13501) for glass use the following system:

E – Integrity

W – Low Radiation

I – Insulation

Accordingly, the following types of glasses are available in the FRG range

E Class – They provide for only integrity. These are special tempered glasses and they prevent the spread of flames to the non-fire side. There will be no protection from radiation in this type of glasses. They are normally used for internal applications.

EW Class – These are tempered and laminated glasses. They prevent the flames and also control the radiation on the non-fire side to a maximum of 15KW per sqm. They offer integrity and provide for low heat radiation. They are used for internal and external applications.

EI Class – These type of FRG glasses offer integrity and insulation. The maximum temperature on the non-fire side does not exceed an average of 140 degree Celsius.

Specialised glass is one of the ways to protect from fire and fire hazards. A range of high quality, fire-resistant glasses are available today to mitigate the adverse effects of fire accidents and offer enhanced protection.

- Wired Glass – It is more stable at higher temperatures and is also resistant to the pressure of fire hoses as the embedded wire mesh helps the glass keep its structural integrity even after thermal stress causes cracks. This property makes wired glass ideal for preventing fire ingress
- Borosilicate Glass – Famous for its application in the manufacture of cooking vessels, Borosilicate, because of its extremely low thermal expansion coefficient, is ideal for any application that requires heat resistance
- Toughened Glass – The special tempering process used in this glass makes it highly resistant to stresses. Additionally, even when it gets to the point of breaking, it crumbles into small granules that are very less likely to cause any injuries
- Toughened Glass with flame retardant coating – This flame retardant coating is typically metal that further enhances the flame and heat resistance of the glass
- Toughened Glass with Intumescent gel – As is the property of any intumescent, the gel increases greatly in size when exposed to fire, and its high hydration content keeps the surrounding areas significantly cooler than any other material. This kind of glass is highly efficient in locations within buildings with higher concentration of people
- Laminated Glass with Intumescent layers – Highly desirable for façades, the lamination makes it hardy enough for the façade and windows, and the intumescent layers restrict temperature rise during fires although the glass is 100% transparent and lacks wiring within

Conclusion

It would be unfair to blame glass for the destruction caused by fire in buildings. In most cases, it is negligence and/or illegal/poor-quality design and construction that result in loss of life and property. If proper norms and building safety codes are followed, and guidelines adhered to, glass façades only help in fire rescue and not make it worse. All over the world, glass is a widely-accepted building material utilised on a massive scale for architecture and design.

Glazing
The aesthetic way to saving energy and costs

Glass, an integral part of modern architecture, helps architects and interior designers realise their creative aspirations. It makes interiors brighter and livelier, reduces the need for artificial lighting, keeps the connect between interiors and exteriors and most importantly, helps to save energy and hence, costs.

Energy-efficient glasses, used in façades and windows, prevent heat-gain in buildings during summers and heat-loss during winters – making interiors comfortable for occupants in all seasons. They can reduce the total energy consumption by 8-10%, resulting in accrued savings over the years.

With the launch of Energy Conservation Building Codes (ECBC), and Green Building Practices now becoming popular, builders, architects and owners are showing greater interest than ever in buildings that reduce energy consumption and increase savings.

- **Visual Light Transmission**
- **Solar Factor**
- **U-Value**
- **Internal Reflection**

These performance parameters of glass make buildings more efficient and ecologically viable

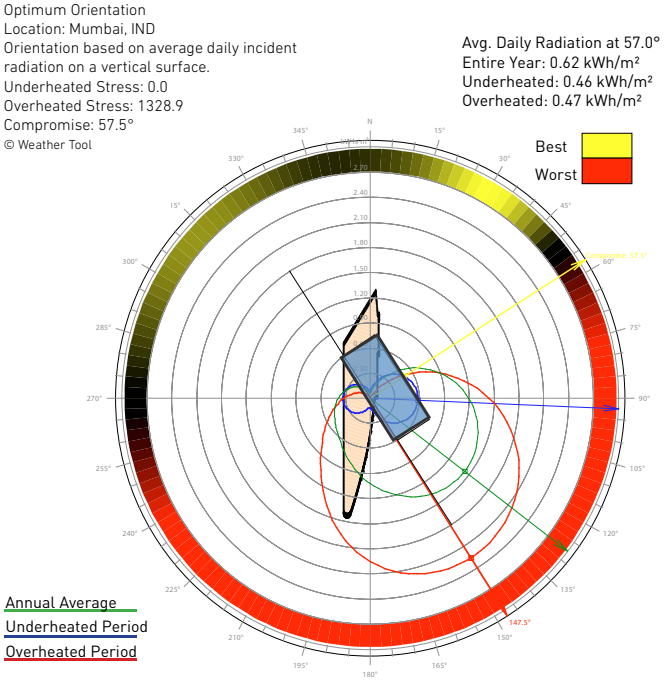
'Green' glass is a double winner

In Mumbai, we conducted the energy performance analysis of a building equipped with a high-performance glass. The cost-benefit analysis and the end results clearly showed that this glass enabled a high level of both energy and cost savings.

Some details of this building are:

- Climatic data: Mumbai weather from Energy Plus
- Building typology: Residential building
- Construction: RCC with brick masonry
- Artificial lighting: CFL at a grid of 2 x 2 m
  Lighting control is kept on for all the simulations
- HVAC system: Fan coil unit
- Window framing material: Aluminium
- Window glazing: As per proposal

For all simulations, the only variable parameter was 'window glazing' to assess its performance. The software used were: 'Ecotect' for Climatic and Shadow Analysis and 'Design Builder' for Building Energy Simulation.



Orientation Analysis

- If the building is less optimally oriented, it will lead to extensive heat gains from east and west, and hence to increasing HVAC loads
- Optimum orientation for building is along E-W axis at 147° N (highlighted in blue)
- The current orientation of building is in brown, indicating how it is orientated on-site

Daylight Area and Cost-benefit Analysis

Glass	VLT	SF	U-Value	Rate (Rs. / sq. m.)	Daylight %	Total Electricity Consumption (KWH)	Annual Electricity Cost (Rs.)	Annual Savings (Rs.)	Glazing Cost (Rs.)	Extra Payment for HP Glass (Rs.)	Payback (Months)
base case	92	87	5.8	800	40	1715343	1,02,92,061		28,00,000		
HPG 1	35	46	5.8	1300	16	722184	43,33,104	59,58,956	45,50,000	17,50,000	3.5
HPG 2	43	48	5.8	1300	24	75334 8	45,20,090	57,71,971	45,50,000	17,50,000	3.6
HPG 3	46	47	5.8	1300	25	737392	44,24,355	58,67,706	45,50,000	17,50,000	3.6
HPG 4	56	48	5.8	1300	32	753023	45,18,137	57,73,924	45,50,000	17,50,000	3.6
HPG 5	25	35	5.8	1300	10	587213	35,23,276	67,68,785	45,50,000	17,50,000	3.1
HPG 6	32	46	5.8	1300	12	722303	43,33,819	59,58,242	45,50,000	17,50,000	3.5
HPG 7	39	52	5.7	1300	21	821483	49,28,898	53,63,163	45,50,000	17,50,000	3.9

(In the above table, Cost of Electricity is calculated at Rs. 6 /unit & Quantity is 3500 sq. m. The mentioned rates are assumptions used for energy and payback calculations only. However, the market rate will differ and include taxes & wastage charges. HPG refers to High Performance Glass.)

Post the detailed Building Analysis on Energy Performance and comparing with a\the base case, it is very clear that HPG 5 is the best performing option with a payback period of 3.1 months and 66% energy saving.

This is just one of the many examples in which façades made with energy-efficient glasses have helped customers get the double benefit of energy saving and cost saving. Apart from creating beautiful exteriors!

Eye Catcher!

Raheja, Hyderabad, features Enhance Cove solar control glass from the Ecosense range of high performance glass from AIS

Inside Info

Creating the illusion of more space where there is none

Rapid urbanisation has led to shrinking spaces, be it in residential or commercial buildings. Can these limited spaces be 'made bigger'? Yes! The answer lies in glass. Its property of being transparent can trick the eye by creating the impression of greater space due to visibility and light transmission.

For example, glass screens or partitions can divide a room without reducing its size, especially if the barrier has to be physical, not visual. But if privacy is a concern, using frosted glass fulfils this need. Switchable glass is even better. It is a special kind of glass that is both opaque and transparent, and can be switched between the two with the touch of a button.

Another ingenuous way to increase a room's size visually is to use mirrors. In fact, using mirror tiles on an entire wall creates the impression of a room being double its actual size.

When used as end-to-end doors and windows, glass breaks down the barriers between the outside world and the interiors, thus visually bringing the outside space, inside. Here, uPVC doors and windows come into play, with today's technology making many types of windows and doors possible. Sliding & folding doors for instance, don't just save space but also make spaces like balconies, conferences rooms and store fronts look chic and modern.

Another contemporary touch that makes spaces look bigger and brighter is the skylight. A skylight in the right place can work wonders for the interiors, making them look livelier as well.

These are but a few ways in which glass can add 'space' where there isn't much to spare. Shower enclosures and cubicles, glass stairways, floors & balustrades, even simple glass shelves – the possibilities are endless. Space today is at a premium, but thankfully, there is glass and the imagination of designers everywhere.

AIS Fresh

AIS expanded its existing portfolio in the architectural segment with a new product – AIS Swytchglas.

A special glass that turns from being transparent to translucent, and vice versa, with the press of a button. Made using Polymer Dispersed Liquid Crystal (PDLC) film, and operable with both remote and manual control, it ensures instant privacy in contemporary form. It is ideal for personal spaces, office cabins and modern conference rooms.