Apartment Balcony Sliding Doors

Wind Investigation

Altair Apartments

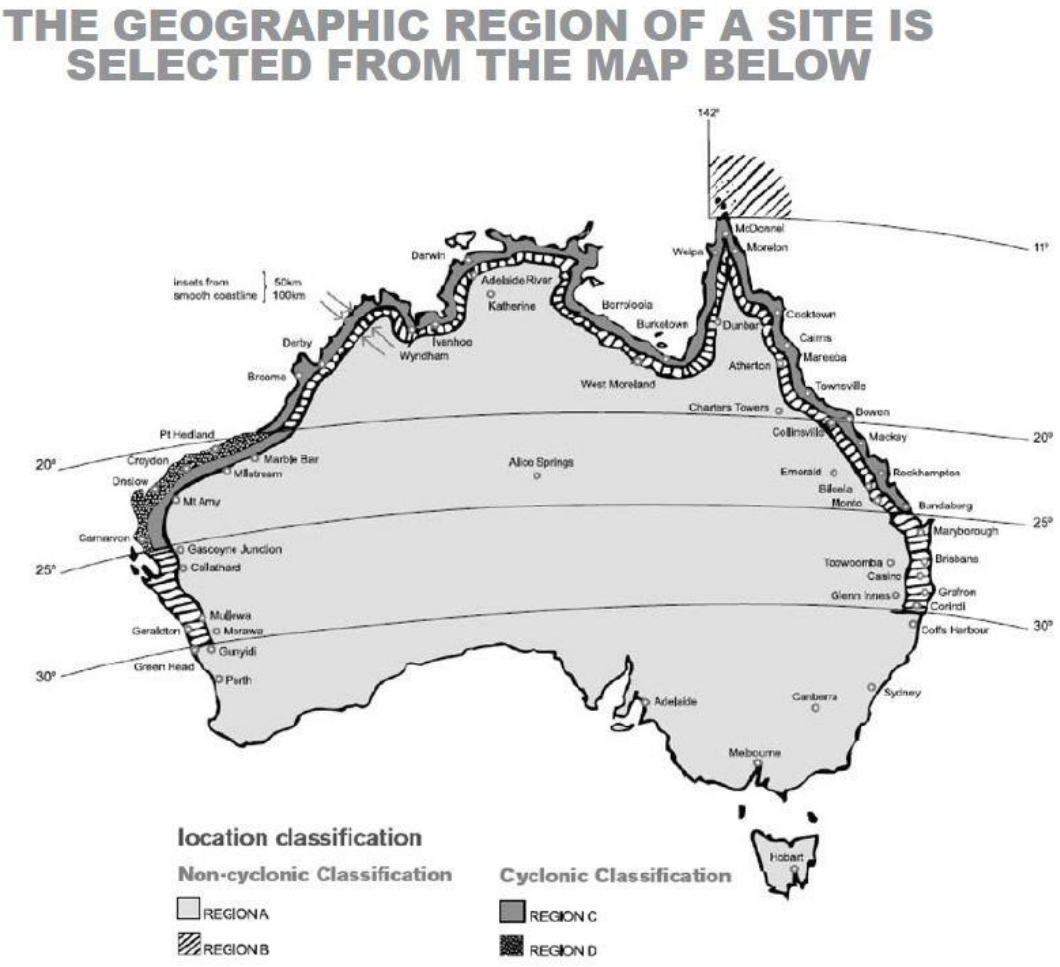
3 Kings Cross Road

Rushcutters Bay

Review

The doors specified by the architect, for the Altair build, are amongst the highest rating for sliding doors for the Sydney region. Doors are rated by their ability to withstand wind *gusts* and their ability to drain *storm* water. These ratings are determined by coastal regions around Australia from A to D. Sydney is located in Region A. This region is rated at wind gusts of 41m per second or 147kms. Region D in comparison is rated at 69m per second or 248kms.

Please see the map below.



The door performance ratings however don't rate a door as a complete air tight seal. This is because a sliding door system has felt seals and junctions where the extrusions meet and engage. At these junctions there are gaps that can not be sealed due to the nature of a sliding door system. Furthermore, the seals are not continuous around the slider / sliders.

Only casement and awning windows provide a complete air tight seal. This is because they have a continuous seal around the complete window. Much like a car door.

Manufacturers of sliding door systems, subject their products to positive and negative forces on a test rig prior to commercial release. The door system is also subjected to high pressure water tests that simulate torrential rain at Region A speeds.

To assist your understanding of this report, we need to cover some terminology: -

- The vertical pieces of the door system are called a Stile
- The horizontal pieces are called Rail
- The top section of the door frame is called Top Sill
- The bottom section of the door frame is called the Door Sill
- The ribbed horizontal sections at the top and bottom are called the Threshold.

Starting at the outside bottom of the door you will notice the gap between the two interlocking stiles. This gap has the potential to allow air to flow through. This gap is necessary to allow the door to slide on the Door Sill and achieve its purpose. See below.

At the top of the door outside, you will notice a gap at the top of the door. This gap also has the potential to allow air to flow through. This gap is necessary to allow the door to slide on the Door Sill and achieve its purpose. See below.

At the top interlock junction (where the two vertical stiles engage) you will notice a cut out. This space is required for the sliding sash to be adjusted for smooth operation and also allows for some movement of the Top sill. See below.

The three areas mentioned above are at each point the junction of six pieces of extrusion. Two vertical stiles, two horizontal rails, a door sill and a door threshold. It is not possible to achieve an air tight seal with so many moving parts at these junctions. Multiply this by the number of junctions points on all the doors in an apartment and this shows the amount of air gaps with in the door system.

The design of Altair and its natural cross ventilation system presents unique forces to its or any other sliding door system available. This ventilation system provides *sustained* positive and negative air pressure as compared to *gusts* for which the system was designed. The amount of airflow from the large vents in the lift lobbies on all floors and the louvered doors on level four will find the smallest gaps and force a large amount of air through the sliding door system.

Approximately 17 years ago, Timber and Glass was engaged to investigate the same issue of wind / noise concerns with the balcony doors and if a solution can be found about this issue. Building management asked that we conducted a test scenario. A floor was chosen on the west tower, where the ventilation grill in the lift lobby was removed. The opening was then sealed with plywood. The sealing of the vent eliminated the airflow through the sliding doors to those apartments sharing that lobby. A series of holes were cut in the plywood over a period of time to find a balance between natural ventilation and minimal airflow through the door system. This test scenario showed that with the correct balance point of a reduced air flow / pressure, in the lobby ventilation, the wind penetration through the balcony doors was almost nil.

However, what was not realised at the time was that the reduced air flow / pressure had a direct effect to a critical item in the fire safety system, the stair pressurisation system. When the annual fire test was conducted for the fire stairs pressurisation system, the system test failed. To place the system back in compliance the lobby vent was returned to its original state.

Altair has been in service for 20 years. During this time Sydney has experienced major weather events. The door system has withstood High winds and heavy rain on many occasions. There have been no water leaks reported, no broken glass or doors dislodged due to wind pressure. The door system has and continues to perform to its design specifications.

There is no workable solution to sealing all the air gaps in the doors.

An experiential avenue, meaning that there is no guarantee that any reduction what so ever, in wind flow through will be achieved, is to possibly place a rubber stop of some description on the ends of the doors. See below.

Noting again that this action is purely experimental and come with no guarantees.

Hovik Ohanessian

Date 23-10-20.

Timber and Glass Joinery