



CPD Tutorial Summary AS 2047 & AS 1288

Learning Objectives

1. Awareness of the various performance requirements of AS 2047
2. Appreciate the trade-offs between performance, size and window configurations
3. Awareness of the factors influencing glass strength
4. Understand how the risks of human impact can be managed through glass selection and design

AS 2047 "Windows and external glazed doors in buildings" specifies the performance criteria for external windows and external glazed doors.

AS 2047 specifies required performance levels for:

1. Ultimate design wind pressure (ability to resist damage)
2. Serviceability design wind pressure (ability to resist deflection of structural members)
3. Water penetration resistance (ability to manage water back outside)
4. Air infiltration (resistance to air leakage when window is closed)
5. Operating force (to initiate and maintain movement) - not required for louvre windows, but advisable to interact with samples as some louvre windows are heavy to operate.

Required performance levels based on:

- Housing (class 1 & 10) - AS 4055 considers wind region, topography etc and gives a N or C rating. AS 2047 then defines the wind pressures and water penetration required for each N or C rating.
- Non-housing (class 2 - 9) - AS 1170 considers many more factors in formulas that output the ultimate and serviceability design wind pressures. AS 2047 specifies that water penetration must be 30% of the positive serviceability design wind pressure.
- Air infiltration - AS 2047 defines maximum allowable ratings for low and high air infiltration levels.

Responsibilities:

- Ratings must be nominated by a suitably competent and experienced person.
- The purchaser must nominate the required ratings to the manufacturer/supplier.
- The manufacturer should verify that the supplied window and door assemblies meet the ratings nominated by the purchaser.

Performance tradeoffs vs window configurations

- Stronger louvre blade materials allow wider windows:
 - Monolithic glass is stronger than laminated glass.
 - Aluminium is stronger than annealed glass blades.
 - Toughened monolithic glass is stronger than aluminium blades.
- The Breezway Stronghold System mechanically fixes blades into clips increasing the window strength allowing wider windows.
- Shorter windows generally achieve higher water penetration resistance than taller windows.
- Altair Louvres at off-standard heights with fixed top blades can limit the possible water penetration resistance.



- Deep overhangs provide protection from driving rain and so can allow larger window sizes.
- Windows within 1.2m of convex corners are subjected to higher wind pressures and so may need to be smaller.

[Side note - Laminated glass is seldom used in louvres due to:]

- [The high risk of delamination on exposed edges]
- [Being the weakest blade material results in narrower allowable window widths and higher risks of breakage]
- [Louvre blades are generally not retained within clips so broken blades would not be retained in place]
- [AS 1288 does not allow laminated glass louvre blades in situations where Grade A safety glass is required]

AS 2047 requires windows for housing to have labels identifying:

- The window manufacturer
- The ultimate design wind pressure
- The serviceability design wind pressure
- The water penetration resistance

For easier identification for servicing, labels on Breezway window systems additionally include the sales order number and the line item number.

AS 2047 requires physical testing of windows and doors to AS 4420

- Test reports should be made available to verify performance claims made by manufacturers
- NATA accreditation of testing laboratories provides confidence that testing is of high quality
- Test results cannot be attributed to windows with:
 - Significant window size changes, or
 - Different louvre blade material
 - Different louvre blade size.

AS 1288 "Glass in buildings - Selection and installation" specifies the procedures for selecting glass types, thicknesses and sizes required for glass in buildings that is subjected to wind loading, human impact and special applications.

Wind loading predominantly affects the maximum allowable spans of individual pieces of glass. The factors considered are:

1. Glass thickness.
 - Thicker glass is able to resist greater forces than thinner glass, therefore allowing greater spans.
2. Glass type (processing performed on the glass).
 - AS 1288 covers (in order of increasing strength) annealed, laminated, heat strengthened and toughened glass. Double glazed units are also covered.
 - Toughening and heat strengthening have no effect on energy efficiency of sound reduction.
 - Laminating has a negligible impact on energy efficiency (tinting, coatings and air gaps deliver large improvements in energy efficiency)
 - Laminating has a minor effect on sound reduction, double glazing has more of an effect, but by far the largest impact is from large air gaps in secondary glazing.



3. Glass shape/aspect ratio
 - The span is the smaller dimension of the height or width
4. The number of edges supported
 - The span is the unsupported edge in glass supported on 3 sides
 - The span is the distance between supported edges in glass supported on 2 sides.
5. The design wind pressure.

When broken, unprocessed glass forms large, sharp shards which can cause severe injuries.

AS 1288 aims to prevent glass breakage under the most likely forms of human impact.

AS 1288 defines the situations where human impact with glass is most likely.

High risk locations include:

- In and around doors
- Low level panels
- Panels which could be mistaken for doorways or openings
- Wet areas
- Schools, early childhood centres, aged care buildings, nursing homes
- Buildings where the planned activities could generate high risks - eg gyms, enclosed swimming pools

AS 1288 reduces the risk by requiring:

1. Minimum allowable glass thicknesses
2. Maximum allowable glass sizes
3. Grade A Safety glass to be used (ie toughened or laminated glass)
4. Glass to be made readily apparent (by applying an opaque band or pattern)

Design options to avoid glass panels from being mistaken for doorways:

- Difference in floor level >1000mm
- Sight size width <500mm
- Sight size height ≤1000mm
- Lowest sightline ≥500mm above floor level
- Rail/transom partly between 700mm and 1000mm above floor height
- Glazing is opaque/patterned
- Louvres with blade height ≤230mm

Toughened glazing can spontaneously fracture after many years due to contamination by nickel sulphide crystals. Overhead glazing, or glazing >5m above finished floor level, must therefore be:

- Heat soak tested, or
- Provided with suitable protection (eg balcony/awning) that extends outwards a minimum of 2/3 of the height of the panel.