

Ordinary annealed float glass in a heat or fire situation readily transmits heat and upon breaking allows the passage of flames and smoke. Provisions within the National Construction Code (NCC) and Australian standards require the use of fire resistant glazing in buildings. For bushfire prone areas, AS3959:2018 Construction of buildings in bushfire prone areas, provides for either a deemed to satisfy or alternative solutions for window glazing based on a **BushFire Attack Level (BAL) rating**.

LIMITATIONS OF STANDARD GLASS

Glass is not a combustible material but in the event of fire allows heat to transmit and upon breakage, passage of flame and smoke. Glass can break due to temperature shock with the following approximate temperature differences;

- > 40°C - Annealed float glass
- > 130°C - Heat Strengthened glass
- > 200°C - Toughened glass

The sudden temperature differences can occur such as in flashover fire events or where water from sprinklers causes enough temperature shock difference to break the glass.

BUSHFIRE RESISTANT GLAZING

For bushfire prone areas, AS3959:2018 Construction of buildings in bushfire prone areas, provides for either a deemed to satisfy or alternative solution for window glazing based on a BushFire Attack Level (BAL) rating. The deemed to satisfy section of this standard prescribes the use of glazing with bushfire resistant shutters and/or metal screens depending on the level of bush fire rating.

An alternative approach where shutters or screens are not desirable is to test the complete window assembly which must then pass the test procedures in AS1530.8.1.2007.

FIRE RESISTANT GLAZING - GENERAL BUILDING COMPLIANCE

Per NCC requirements, a building must have elements during a fire which will to a degree, maintain structural stability, avoid the spread of fire, smoke and heat and any toxic gases likely to be produced. The glazing requirements stipulate the use of fire resistant window systems that pass a specific FRL (fire resistant level). Any proposed window specification must also be identical in size, components and installation to the tested prototype.

FRL SPECIFICATIONS

- > FRL - or 'Fire Resistant Levels' refers to the grading periods in minutes of fire windows for the following criteria;
- > Structural adequacy - refers to the ability to maintain stability and adequate load bearing capacity as determined by AS1530.4;

- > Integrity - refers to the glazing's ability to resist the passage of flames and hot gases as specified in AS1530.4;
- > Insulation - refers to the ability to maintain a temperature on the glass surface not exposed to the fire below the limits as specified in AS1530.4;

Specifications for FRL could be expressed in this order -/60/30. The - or dash refers to no structural adequacy requirement, a 60 minute integrity and a 30 minute insulation rating for a fire resistant glazing. (See example of FRL Table 1 below).

TABLE 1: DEFINING AN FRL SPECIFICATION

-	/60	/30
or no requirement	or 60 min	or 30 min
Structural Adequacy	Integrity Requirements	Insulation Requirements

FIRE RESISTANT GLAZING - TYPES OF GLASS

Fire resistant glazing systems can be categorised into non-insulated and insulated units. As stated, the FRL can only be attained if the complete unit has been tested previously as a prototype. Framing for fire resistant windows is either made of steel or hardwood timber. Hardwood timber frames are naturally insulating while steel can be made either insulating or non-insulating.

NON-INSULATED

Wired glass is a typical non-insulating product. For clear through vision, clear polished wired is used. This product has been tested to achieve -/60/-, or only a 60 minute integrity fire resistance in a steel frame. Wired glass upon exposure, breaks but the wire retains the glass fragments in place. Wired glass is classed as a Grade B safety glass and per AS1288 is suitable for fire rated door applications. Other non-wired glass products are also available providing basic integrity ratings and available as Grade A Safety Glass.

INSULATED

There are two types of insulating glass products:

- > The first type uses a clear intumescent interlayer in a laminated or multilaminated glass make-up. Upon heating in excess of 120°C, the interlayer turns into a rigid and opaque fire shield. The higher the FRL requirement, the thicker the glass and the greater the number of interlayers;
- > The second type consists of a gel interlayered glass in a sealed glazing unit. The cavity is filled with a clear heat absorbing gel. Both products can provide high levels of integrity and insulation and satisfy Grade A safety glass requirements.

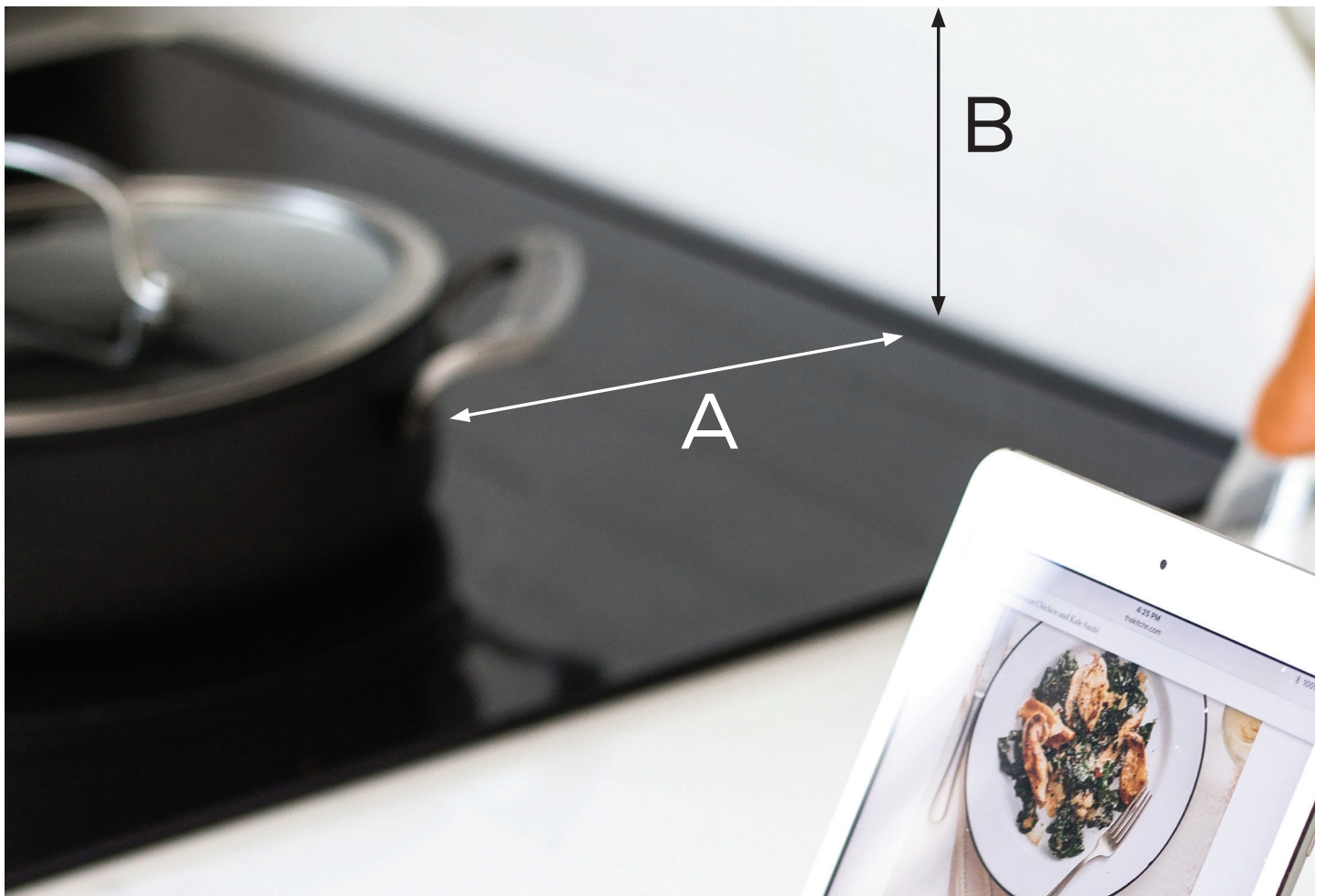
HEAT RESISTANT GLASS PRODUCTS

Refers to types of glass which have been designed to handle temperatures in excess of 250°C such as Neoceram, Vycor and Neotherm® for specific applications. It also refers to applications where there are no BCA, legislative or Australian Standard requirements but where the use of a heat resistant glass is recommended.

NEOCERAM

This is a 5mm thick 'brownish tinged' transparent ceramic glass with very low thermal expansion and mechanical resistance. Suited for food ovens, fireplaces, combustion wood heaters and stoves where temperatures do not exceed 700°C. (This product can withstand short term temperatures of 800 °C). Its cutting and breakage characteristics are similar to annealed glass. Edges should be arrised prior to installation. When installing Neoceram, care must be taken to ensure the edges are not damaged. They must be protected by means of fire resistant cord or ribbon, glass fibre or some other non combustible material to prevent breakage. Direct metal to glass contact must be avoided.

DIAGRAM 1: EXTRACT FROM AS 5601 GLASS SPLASHBACKS AND COOKTOPS - DETAILING MEASUREMENT REQUIREMENT.



A = If less than 200mm from periphery of gas burner or electric element to vertical combustible surface under the glass splashback, the wall material must be constructed such that the temperature of the combustible surface does not exceed 65°C above ambient. Using a suitable non combustible wall material supplied, approved by the builder can satisfy this requirement.
B = Reading in conjunction with A, non combustible wall material behind splashback must be at least 150mm high.