Module 23: Windows, doors, glazing & gates

Module Objectives

By the end of this session, participants will understand:

1. Window and door terminology and what to look out for when inspecting windows and doors.
2. Glazing (glass) regulations and safety issues relating to homes.
3. The importance of a fire door where a garage is joined to a dwelling unit.
4. Garage doors – how to inspect these and safety issues.
5. Driveway gates – how to inspect these and safety issues.

Module at a glance:

<table>
<thead>
<tr>
<th>Topic</th>
<th>You will learn</th>
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</table>
| Windows and doors  | - Terminology  
                     | - How to inspect these components                                                |
| Glazing            | - About glazing regulations and safety issues regarding glass in South African homes |
| Fire doors         | - About a fire door and when one is required.                                    |
| Garage doors       | - About safety issues regarding garage doors.                                    |
| Driveway gates     | - About safety issues regarding driveway gates.                                   |
Windows & doors

The home inspector needs to inspect and report on the condition of windows and doors, viewing these installations from both sides. Some woods used to describe parts of windows and doors

Architrave: A moulding (usually wooden) around a door or window frame.

Escutcheon: A trim piece or decorative flange that fits over a keyhole.

Furniture: The handles, knobs and locks which form part of the window or door.

Hinge: The mechanism connecting the frame to the side of a door or window which allows the window to open and close.

Jamb: The side or top of a door or window opening.

Light: Single pane of glass in a window.

Louver: An opening with a series of horizontal slats arranged so as to permit ventilation but to exclude rain, sun, light, or vision.

Mortise lock: Mortise extends through the striker plate on the door jamb (style) when the key is turned. Also called a “deadlock”.

Mullion: A vertical bar or divider in the frame between windows, doors, or other openings that supports.

Pivot: A pin system, extending from the door or window into the frame, which allows the window or door to open or close, not from the side.

Reveal: The part of the side of a window or door opening, that is between the outer surface of a wall and the window or door frame.

Sash: The operating or movable part of a window; the sash is made of window panes and their border.
Sash Balance: A device, designed to counterbalance sliding sash windows.
Striker plate: The flat metal portion of the locking mechanism which attaches to the door frame.

Common issues which may be observed are:

- Masonry and plaster cracks in places around the window or door. Because they create an opening in the wall, windows and doors constitute a potentially weak point in the wall, and cracks (particularly diagonal cracks starting in the corners) will often be observed stretching outwards from the wall opening.

- Lack of adequate weather sealing around the frame. This problem is usually confined to aluminum frames, which are often screwed into position only after the wall has been built and plastered. Metal door and window frames are usually secured to the masonry by building in the metal lugs which are attached to the door or window.

- Deterioration of the frame and door/window. This problem is mostly observed with exterior wooden installations, which become weathered if not regularly maintained.

- Worn out or damaged rollers on sliding aluminum doors.

- Dried out, cracked and missing glazing putty.

- Broken glazing, or safety issues arising from the use of non-safety glass.

- Broken or damaged window and door “furniture” – “furniture” refers to the metal items attached to a door or window - i.e. the handles, knobs and locks.
Window types

(a) Fixed light  (b) Vertically pivoted (hung off-centre)  (c) Vertically pivoted (hung centrally)

(d) Top hung  (e) Bottom hung  (f) Side hung or door

(g) Horizontally pivoted and reversible  (h) Horizontally sliding; 6 blocks to each pane  (i) Vertically sliding

Glazing
The National Building Regulations govern the glazing (glass) standards for South African homes and structures:

Glazing must be secure and durable and must be fixed in a manner and position that will ensure that it will:

- Safely sustain any wind loads to which it is likely to be subjected;
- Not allow penetration of water to the interior of the building;
- Be apparent, In the case of clear glazing, to any person approaching such glazing.
Consideration...

The possibility of human impact with the glazing must also be taken into account when determining which areas require safety glass.

The NBR says the following must be considered in regard to potential problems involving people impacting the glass:

- The position of the glazed area;
- The number and likely behaviour pattern of people expected to be in close proximity to the glazed area.

NN2.4 Where clear glazing is used and is not likely to be apparent to or suspected by any person approaching it, such glazing shall bear markings, which shall render such glazing apparent to such person.

Types of glass

It is important to understand the differences between ordinary window glass, laminated (safety) glass and toughened glass.

Annealed glass

Ordinary window glass – annealed glass - and most such glass found in SA homes vary in thickness from 3-6mm. Float glass is annealed during the process of manufacture by controlling the rate of cooling.

Annealing is a process of slowly cooling glass, to relieve internal stresses after it has been manufactured. The process is carried out in a temperature-controlled kiln. However, ordinary annealed window glass is still brittle, breaking into long sharp pieces which can cause serious injuries.
**Toughened glass**

Toughened or tempered glass is a type of safety glass processed by controlled thermal, or chemical treatments, to increase its strength compared with normal glass. Tempering creates balanced internal stresses which cause the glass, when broken, to crumble into small granular chunks instead of splintering into jagged shards. The granular chunks are less likely to cause injury.

Toughened glass is physically and thermally stronger than ordinary annealed glass. For glass to be considered toughened, the compressive stress on the surface of the glass, should be a minimum of 69 MPa. For it to be considered safety glass, the surface compressive stress should exceed 100 MPa.

It is this ability to withstand compressive stress, that gives toughened glass increased strength. However, the toughened glass surface is not as hard as annealed glass and is therefore somewhat more susceptible to scratching.

Toughened glass is used in buildings for unframed assemblies (such as frameless doors), structurally-loaded applications, and other applications that would become dangerous in the event of human impact. Toughened glass is also used for the side windows of motor vehicles (laminated glass is normally used for the windscreen) and for cooking utensils like Pyrex.

**Warning…**

*Toughened glass cannot be cut once it has been toughened.*
Laminated glass

Most safety glass used in SA homes is laminated glass.

Laminated glass is a type of safety glass that holds together when shattered. In the event of breaking, it is held in place by an interlayer, typically of polyvinyl butyral (PVB) between its two or more layers of glass. The interlayer keeps the layers of glass bonded even when broken, and its high strength prevents the glass from breaking up into large sharp pieces.

This produces a characteristic “spider web” cracking pattern when the impact is not enough to completely pierce the glass.

*Did you know...*

Laminated glass is normally used when there is a possibility of human impact, or where the glass could fall if shattered. Skylight glazing and motor vehicle windshields typically use laminated glass.

The PVB interlayer also gives the glass a much higher sound insulation rating, due to the damping effect, and also blocks 99% of incoming UV light.

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Glazing regulations

External Glazing – Structures not exceeding 10m in height (3 stories)
Part N of section 3 of SABS 0400.

<table>
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<th>Nominal Thickness (mm)</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
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<td>2.1</td>
<td>3.2</td>
<td>4.6</td>
<td>6.0</td>
<td>6.0</td>
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</tr>
<tr>
<td>Patterned Annealed &amp; Wired Glass</td>
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<td>0.75</td>
<td>1.2</td>
<td>1.9</td>
<td>2.6</td>
<td>3.4</td>
<td>-</td>
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<tr>
<td>Laminated Annealed Safety Glass</td>
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<td>-</td>
<td>-</td>
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<td>Toughened Safety Glass</td>
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<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
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</tr>
</tbody>
</table>

Windows

Any window with a sill height less than 500 mm must be glazed with safety glass.
Important...
If the window is located on normal traffic routes so that people are likely to move directly towards such window, then the sill must have a minimum height of 800mm from the floor or must be glazed with safety glass.
Doors & Entrances

Any pane of glass installed in any entrance door, or door sidelight, must be glazed with safety glass.

Stairways

Safety glass is required in any wall or balustrade to a stairway, ramp, landing or balcony, within 1.8m of the pitch line of such stairway.
Balustrades

All glazing to balustrades must be of safety glazing material. Note that the minimum height for balustrades is 1000 mm and 1200 mm around swimming pools.

Bath enclosures

Any glass used in any bath enclosure or shower cubicle must be glazed with safety glazing material.

Horizontal or sloped glass

Any glass used in any horizontal or sloped glazing, including skylights and enclosures, which is tilted more than 15° from the vertical, must be safety glass.

Mirror doors

When a mirror is used as a facing to a cupboard door less than 800 mm above floor level, and there is no solid backing, then the mirror must be of safety glazing material.

Security bars and gates

Security window bars (burglar bars) and security gates (usually either hinged or expanding metal) are common in South African homes. The home inspector should note the presence of such measures and also the observable physical condition of the items. For instance, is the metal work rusted, or is the lock damaged? The inspector should make clear in the report that he/she has not verified the effectiveness of these security measures.
Doors

House doors

Exterior doors are usually solid timber and interior doors are mostly either hollow core or panel doors. Exterior doors are usually either: Side-hinged, pivot, stable doors or sliding doors (either wooden or aluminum).

Interior doors usually have a two lever mortise lock and exterior doors a three lever or higher. Two lever locks have a limited number of key combinations and are generally considered low security.

The house inspector should note the presence, or absence of keys and also the security level of exterior door locks. In this regard, locking mechanisms which prevent burglars from easily lifting out sliding aluminum exterior doors, should also be noted.

Fire door

If the garage is connected to the house via an inter-leading door, then regulations require that this door must be a “fire door”. A fire door is a solid door which has been made fire resistant – usually by fitting the door with a metal or fibre cement (asbestos) panel.

The National Building Regulations (Part T) state that a fire door linking a garage to a dwelling unit should be solid with a fire resistance of 60 minutes.

A fire door is much heavier and more solid than normal interior doors – and this is usually the best indication for the home inspector that a fire door has fitted.

The fire door is an important safety measure, because fires are more likely to originate in the garage, because of the presence of motor vehicles and the danger of vehicle related fires. A fire door should be installed to open inwards into the garage, so that the door frame prevents it from being blown open in the event of an explosion in the garage.
Garage doors

Garage doors are usually section panel slide-up doors, or roll-up doors. Both of these versions are often automated. Tilt-up single panel garage doors are also fairly common. The home inspector may encounter side-hinged wooden garage doors in older homes.

Both sectional panel and roll-up garage doors have two advantages over single panel monolithic doors: Sectional and roll-up doors do not require any space outside the garage to open. A vehicle may park very close to the garage before opening the door.

Garage doors can be made out of many materials, but steel, aluminum, wood and glass fibre are the most popular materials.

Inspecting garage doors

**Important**

The home inspector should be aware that there are a number of serious safety issues associated with roll-up and automated garage doors. The inspector should look at the garage door springs, cables, rollers, pulleys and other door hardware for signs of wear. The inspector should also check and test the reversal mechanism on automated doors.

A typical single car garage roller door will have a preloaded spring inside the rolling mechanism. The spring reduces the effort required to open the door. Garage door springs, cables, brackets and other hardware attached to the springs, are under very high tension and, if handled improperly, can cause serious injury or death. Only a qualified professional or a mechanically experienced person using the correct tools and carefully following the manufacturer's instructions, should adjust them.

An improperly adjusted automated garage door can exert deadly force when the door closes. This could lead to serious injury or even death if a child is trapped under the closing door. Therefore the safety reverse system test is very important.
The home inspector should check automated garage doors and report to the client whether or not the door has a self-reversing feature.

An automated garage door should reverse on a contact with a 5 to 10cm high object on the floor. If a reversing feature is not present, the mechanism should be replaced. Garage door operators manufactured after January 1, 1995 are required by law (SABS - IEC Standard No.60335 Part 2) to have advanced safety features.

The safety reverse feature can be tested by placing a 50 to 100mm piece of wood on the floor under the door and then closing the door. The door must stop and reverse when it strikes the wood. If the door does not reverse, it should be repaired or replaced.

Force Setting Test: The inspector should also test the force setting of the garage door operator, by holding the bottom of the door as it closes. If the door does not reverse readily, the force may be excessive and may need adjusting. Many garage door operators can be equipped with additional safety devices, such as an infra-red beam or a sensor edge, as an extra measure of safety to protect against entrapment.

**Driveway gates**

There are similar and very important safety issues regarding automated driveway gates.

Automated driveway gates are often heavy metal or wooden structures which have the potential to cause serious injury (especially to children) and damage.

Apart from the condition of the gate, the home inspector should check and report on the following safety issues as regards automated swing or sliding driveway gates:

- Is there an automatic gate safety reversal mechanism or infra-red beam fitted? This can be tested by placing a block of wood in the path of the closing gate. The inspector should also test the force setting of the gate by holding the gate as it closes. The operation of the beam can be checked by blocking the beam with a hand while the gate is closing and checking whether the gate stops or reverses. An infra-red beam is especially important if the gate is set to close automatically after a timed interval.
Heavy sliding driveway gates can also be extremely dangerous if there are no adequate guards or brackets, to prevent the gate from falling if it should come off its rail for any reason. Child deaths have occurred in South Africa as a result of falling driveway gates. An anti-lift bracket should be placed above the gate to avoid the gate being lifted off the rail. Sliding gate safety is governed by strict legislation in many countries, but not yet in South Africa.

Before you take the online test, please......
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