

## Aluminium Windows

### Introduction

Aluminium windows have become popular in new developments and as replacement of steel windows in existing buildings. Recent incidents of failures of aluminium windows, however, have aroused safety concern as falling of a dislodged casement from a height can be catastrophic in densely populated areas.

2. Authorized Persons (AP) and Registered Structural Engineers (RSE) are therefore strongly advised to ensure that aluminium windows used in their projects are designed and installed properly. This practice note provides guidelines for reference of practitioners.

### Design and Installation

3. APs and RSEs have a duty to ensure the buildings under their control meet with the relevant safety standards. Where aluminium windows are proposed, Registered Contractors should have experienced and skilled labour as well as suitable quality assurance procedures in place to ensure the proper installation of the windows. AP/RSE should take steps to ensure that the windows are properly designed and installed according to the relevant specifications.

4. Window members, transoms and mullions together with the glass panes should be of adequate size and strength taking into consideration the location, height and orientation of the windows. Window frames should be securely and rigidly fixed in place to window openings in walls. Adequate site supervision should be exercised to check that all the fixing lugs are properly fixed. The fixing lugs should have a minimum material thickness of 1.5mm and be placed at 300mm centres maximum. For large windows, they should be properly designed in accordance with the requirements laid down in Practice Note for Authorized Persons and Registered Structural Engineers 239.

5. As the majority of the incidents involving aluminium windows are the result of detachment of the openable sashes, particular attention should therefore be paid to the fixing details of the hinges. The hinge itself should be of adequate size and strength commensurate with the size of the window. Aluminium rivets, used to fix the hinge to the window frame and the openable sash, tend to corrode. For better corrosion resistance, it is recommended that stainless steel rivets/screws be used in place of aluminium rivets for the fixing of hinges. However, if stainless steel rivets/screws are used, consideration and measures must be taken to prevent contact between dissimilar metals.

6. Generally and subject to calculations, all structural members of a window section should have a minimum aluminium thickness of 2mm and the depth of the mullion section should be subject to structural calculations as may be necessary and should not be less than 38mm. To enable either the rivet or the screw to have a better anchorage, it is recommended that the side of the member for fixing the hinge be thickened locally. As an alternative, a positive mechanical fixing, for example by inserting a plate or bar/angle inside the section to provide sufficient threads for the screw(s). A typical example of this arrangement is at Appendix A. When local thickening or insertion of an extra piece of bar/angle inside the section is not adopted, an aluminium thickness of 2.3mm for the structural members of the window section is recommended for better strength and rigidity.

### **Water Seepage**

7. Besides safety, water leakage from windows in new buildings poses undue nuisance to the occupants. APs and RSEs are reminded to bear this in mind when detailing window design and contractors are reminded that poor workmanship is a major cause of the problem. Particular attention must be drawn to the following aspects:

- Construction tolerance for window openings should be controlled to stay within the relevant specification requirements;
- Any honeycombed concrete around the window opening should be made good prior to installation of window frames;
- Suitable waterproof grouting should be properly applied between the window frame and the opening, with an additional coat of waterproofing around the window being recommended;
- Joints in window frames and sections should be sealed with suitable sealant in a good workmanship manner;
- A continuous gasket of suitable material should be properly applied along the whole perimeter between the window frame and openable sash;
- As good practice, projecting window heads, flashings or architectural features with water drip detail should be provided where appropriate at the top of windows to improve performance against water seepage.

/Water .....

### Water Tightness Test

8. It is advisable to perform field water test on the installed aluminium window to ensure water tightness and quality of the completed window unit. A recommended testing method is given in Appendix B for reference.

### General

9. A similar practice note has been issued to Registered Contractors.



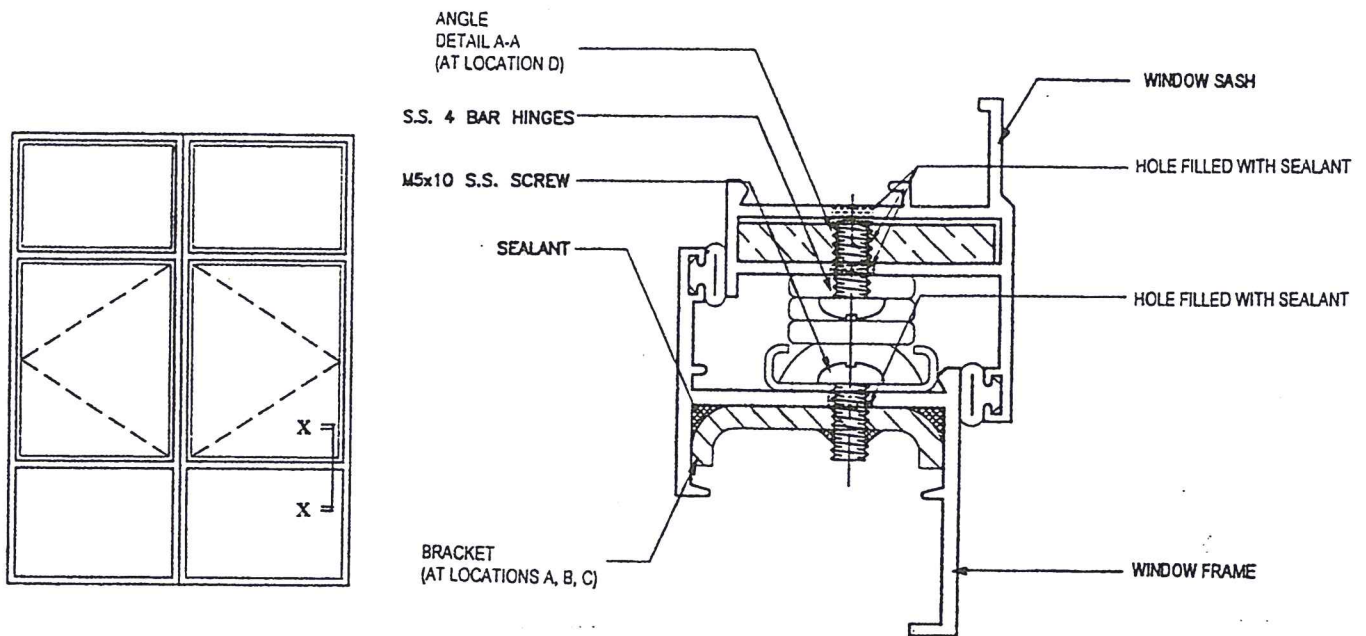
( C M LEUNG )  
Building Authority

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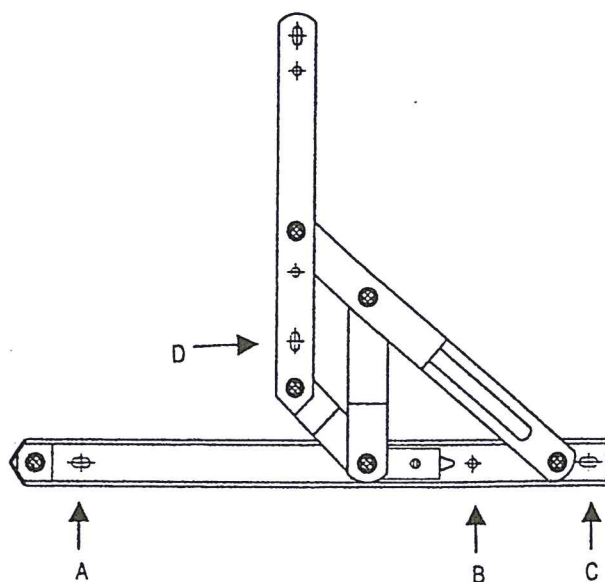
Index under : Aluminium Windows  
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ELEVATION

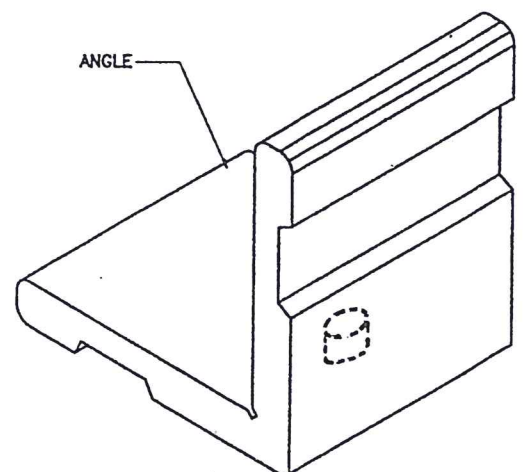
SECTION X-X  
SIDE HUNG WINDOW WITH S.S. BRACKET AND  
ALUMINIUM ANGLE INSERTED FOR FIXING SCREWS



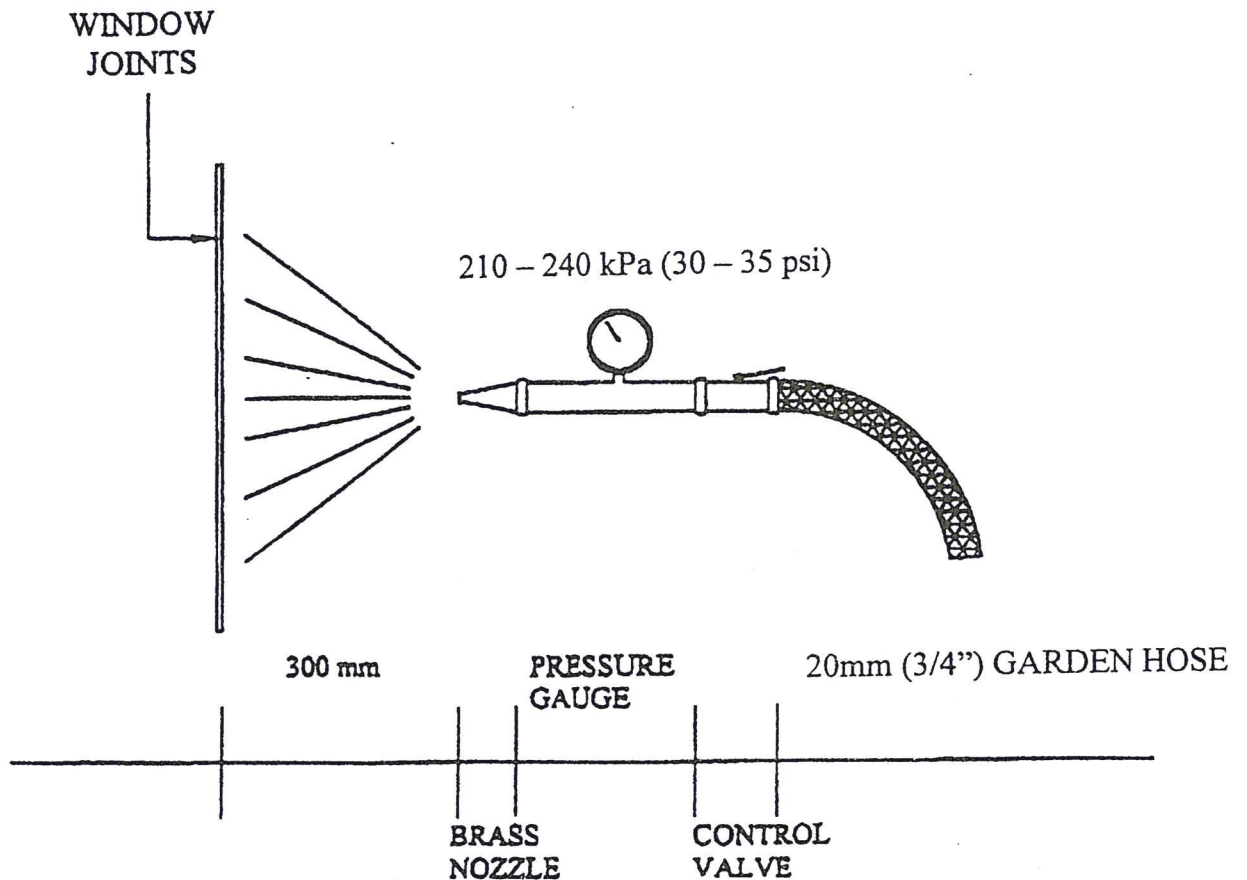
A, B, C – LOCATION FOR SCREW TO WINDOW FRAME  
(LOCAL THICKENING BY BRACKET)

D – LOCATION FOR SCREW TO WINDOW SASH  
(LOCAL THICKENING BY ANGLE)

S.S. 4-BAR HINGE



DETAIL A-A



The nozzle pressure should be adjusted to produce water pressure between 210-240 kPa (30-35 psi) and be continuously applied for 1 minute for every 2m of joint length. The window joints are deemed to have failed where there are signs of water seepage through the joints during the watertightness test.

#### WATERTIGHTNESS TEST