The Building Envelope Authority

Guidance Documents

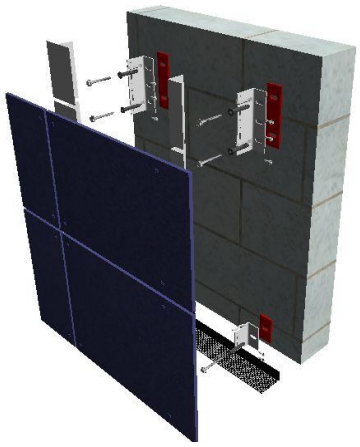
OCTOBER 2013

GD 08 AN INTRODUCTORY GUIDE TO RAINSCREEN SUPPORT SYSTEMS

Rainscreen support systems are the sub frames that are the connection between the backing wall and the rainscreen panels. Their selection is based upon not only the type and style of panel, but also the structure of the backing wall which, in turn, should be reasonably airtight. Their selection should also take into account the loads to be carried and the need for adjustability in respect of building tolerances.

Backing walls can be broadly identified as:

- Masonry (brick, block or concrete)
- Stud frame walls (lightweight steel sections or timber)
- S.I.P (structural insulated panels)
- Built up metal walls (structural trays, sheeting rails/liner sheets)



Typical system to masonry wall

The function of rainscreen support systems is:

- To support and transfer dynamic and static loads back to the building structure (backing wall)
- To take out the tolerances of the main built structure and to provide line and level for the façade panels
- To provide a low maintenance, corrosion resistant and durable interface

LOADINGS

Rainscreen facades are exposed primarily to wind loadings and occasionally impact loads or additional loading from signage and light fittings. It is important to ascertain at an early stage what loadings are to be exerted on the façade. Dead load from the weight of the cladding panels and the sub-frame members, along with dynamic wind load, needs to be satisfactorily accommodated by the backing wall.

In the case of lightweight and stud frames backing walls, care should be taken to avoid the overloading of individual backing wall elements. It is generally not advisable to allow other trades to utilise rainscreen support system members for their own needs unless considered at early design stage.

FIXING REQUIREMENTS

Fixings should be selected and designed to carry all the loads directed back to the (wall) brackets. Validation of a fixing's performance in its connecting substrate is an essential procedure to selection. Whilst manufacturer's performance data is useful at an early stage, site pull-out tests will demonstrate and confirm the capability of fixings to carry the required loads with the desired factors of safety.

Ultimate loads for both the fixing and the substrate can be found by destructive testing on at least 10 pull-outs per fixing in each type of substrate base material. Masonry type substrates, with their many variants, will generally require more extensive testing of 5% of the final quantity of installed anchors. (*refer to CFA Guidance note, 'Procedure for Testing Construction Fixings'*)

In all cases, the tests should relate to the manner and application of the intended installation. Any failures, or significant variances, should be investigated and measures taken to overcome potential shortfalls to fixing strength.

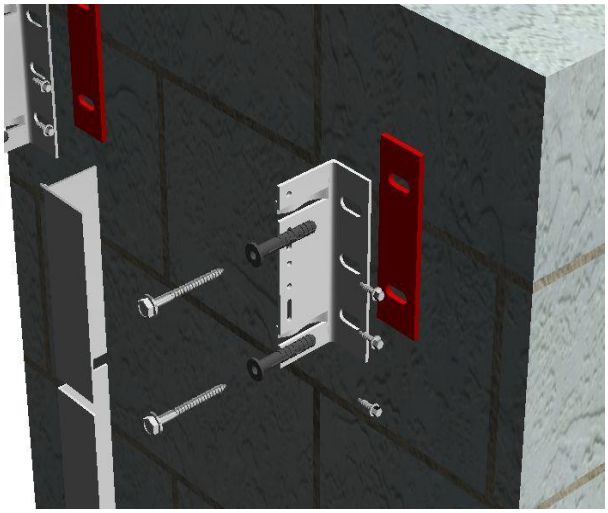
MATERIALS

As rainscreen support systems are both hidden from view and exposed to atmospheric conditions due the open vented and drained cavity, it is essential to select support systems constructed from durable and corrosion resistant materials.

To this end, aluminium features strongly, particularly in extruded form, where it offers designable lightweight corrosion resistant components. Care needs to be taken when considering formed rather than extruded aluminium components to ensure suitable structural grade strength alloys are used (i.e. 5000 series alloys).

Connections of framing components (bracket and rails) should be stainless steel based, although care must be taken to isolate large stainless steel fixings from aluminium components. Suitable isolating materials are nylon or plastic/rubber polymer products.

Aluminium brackets need to be isolated from contact with cementitious surfaces. Thermal break pads will generally cover this, but in the absence of a non-metallic thermal break layer, plastic shims or rubber/pvc membrane materials will suffice.

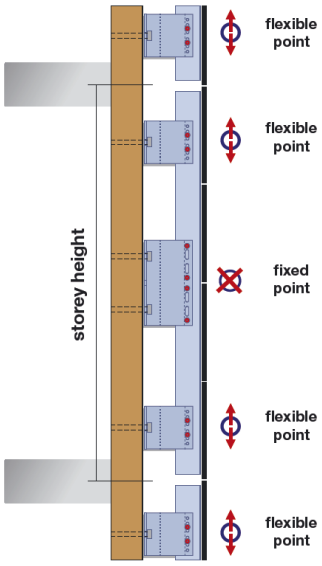


Typical wall bracket assembly

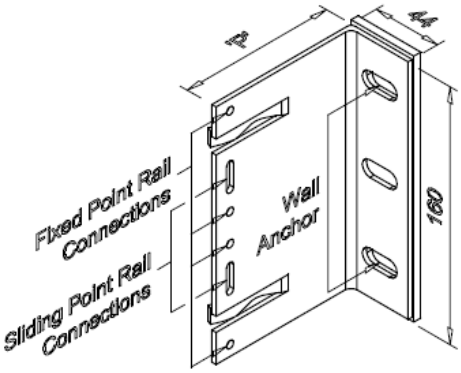
MOVEMENTS AND DEFLECTIONS

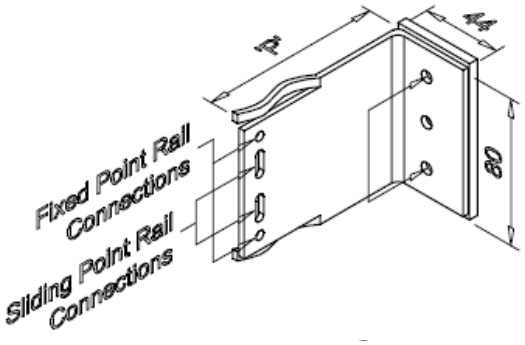
Consideration should also be given to anticipated structural and thermal movements; their direction and magnitude. For example, a masonry wall is likely to be subjected to very small movements, whereas a metal or timber stud structure will incorporate movement joints (deflection heads) which must be equally accommodated within the design and installation of the rainscreen support system.

The thermal expansion and contraction of framing members, plus the possibility of differential movements of differing materials, such as metal and timber, in the construction should be considered.



The allowable bending deflection of framing members, typically that for cladding rails, is limited to Length/200 where the length of the member is less than 3 metres. For members spanning larger distances, such as in the case of floor spanning support systems, the limit is Length/300 +5mm.

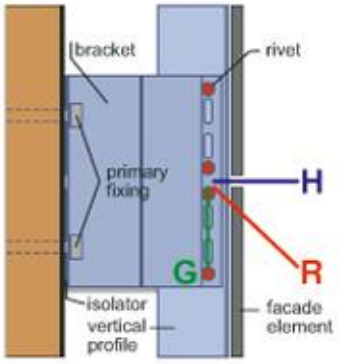


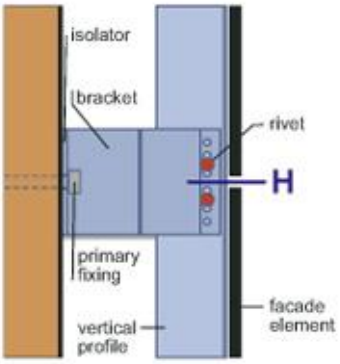


TOLERANCES AND ADJUSTMENT

Tolerances relating to actual stated position, or the relationship of the face of the rainscreen to the primary building structure should be identified and assessed at an early stage. The rainscreen contractor should survey the primary structure for line and level to identify whether the specified rainscreen system can be installed as planned. Sufficient clearance of framing members passing the front of slab edges or beams, whilst maintaining the specified cladding zone will require checking, if appropriate.

Proprietary engineered rainscreen support systems generally incorporate adjustment facilities to overcome the tolerances normally expected from the primary building frame or backing wall. A fundamental and valuable function of the support system is to reduce the larger tolerance and deviation of the primary/back wall structure down to acceptably small tolerances, typically within ±3mm per storey height or structural bay, and ±5mm overall length or height of the building.





Wall bracket components should accommodate the ability for the cladding rails to be finitely adjusted for line and level. Brackets which feature temporary holding finger mechanisms and/or interlocking grooves assist in making efficient use of installation time.

Wall bracket with interlocking

The HELPING HAND® Bracket

DISCLAIMER

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