BEST PRACTICE GUIDANCE FOR DESIGN AND FIXING OF ALUMINIUM FABRICATIONS

Aluminium fabrications associated with roofing and cladding systems rely upon mechanical fasteners to secure them to the structure, and sealants to seal joints and junctions. The importance of the correct selection and application of fasteners and sealants is often underestimated by designers and left to the involvement of the fixer on site. This approach can lead to early and unexpected failures which can be costly to rectify if a robust design process and installation procedure is not fully followed.

These issues are addressed in a new MCRMA document, *Aluminium fabrications and flashings: best practice design and fixing guide* which gives advice on the design of aluminium fabrications and flashings, including fasteners and sealants. The document also includes guidance on material thickness, thermal movement, fastener position and fabrication junctions.

Correct specification starts with the selection of material thickness and the minimum thickness recommended for aluminium fabrications is 0.9mm. Where appearance is of prime importance for example on fascias, due attention should be paid to consider and specify thicker aluminium and also post-painting. Curved fascias may need to be up to 3mm in thickness with welded fabrications which have been surface dressed and factory post-painted. This tends to give a neater appearance than lock-formed thinner materials.

As a general guide, the unstiffened or unsupported widths and material gauges illustrated in table 1overleaf can be used and the fabrication should be specified in 3-series aluminium as this provides the best flatness.

The thicker material option should be adopted where high aesthetic standards are required and the wider limit where appearance is not critical (behind parapets, for example). The mid-range should be suitable for most building purposes.

Gauge mm	Unstiffened width mm
0.9	125-200
1.2	175-300
1.5	225-450
2.0	275-550
3.0	325-650

Table 1 Material gauges for unstiffened widths

In all cases, a suitable lined and levelled support system is required and aluminium fabrications should not be fixed to light gauge roof or wall sheets. In all cases, aluminium fabrications should be isolated from galvanised steel supports using suitable self-adhesive PVC tape to prevent bi-metallic corrosion.

Aluminium expands and contracts due to temperature change; the forces generated due to expansion are large and will cause damage to structures and fasteners unless they are managed and allowed to occur in a controlled manner. The movement has to be accommodated by both fasteners and sealants.

Designers and installers must take this movement and force into account in order to avoid unwanted flexing and buckling. Unless managed, the stresses will load the fasteners and supporting structure to a point where fixing failures will occur or flashings tear.

Daily expansion and contraction of an assembly without adequate expansion can ‘work’ some fasteners resulting in a slow but steady unwinding of the threads and fabrications/flashings becoming loose or detached from the sub structure or adjoining materials.

For most applications the tried and tested fixed point / floating point method of fastening aluminium components will accommodate movement provided that care is taken to detail and install correctly. The fixer should install one 'fixed point' or ‘dead fix’ within the length of each section. This could be a single fastener or a set of fasteners across the girth of the fabrication at right angles to the length of the section.

Typically, the fixed point can be at one end of each section or, perhaps more importantly, at the mid-point position so that movement can happen outwards in both directions. The fasteners can be conventional self-drilling fasteners with washers or suitably specified rivets. The fixing will be solid with no movement capability.

Subsequent fixings should be allowed to 'float' using, for example, an oversized or slotted hole, or sliding clip to allow the aluminium to slide across the fixing - in this way all thermal movement will happen along each metal section from the fixed point towards and past the floating fixing(s) - see figure 1 below.

Clearly, adequate arrangements must be made to manage the expansion and contraction at the end of each section as well as at fasteners and examples of good practice are included in the guidance.

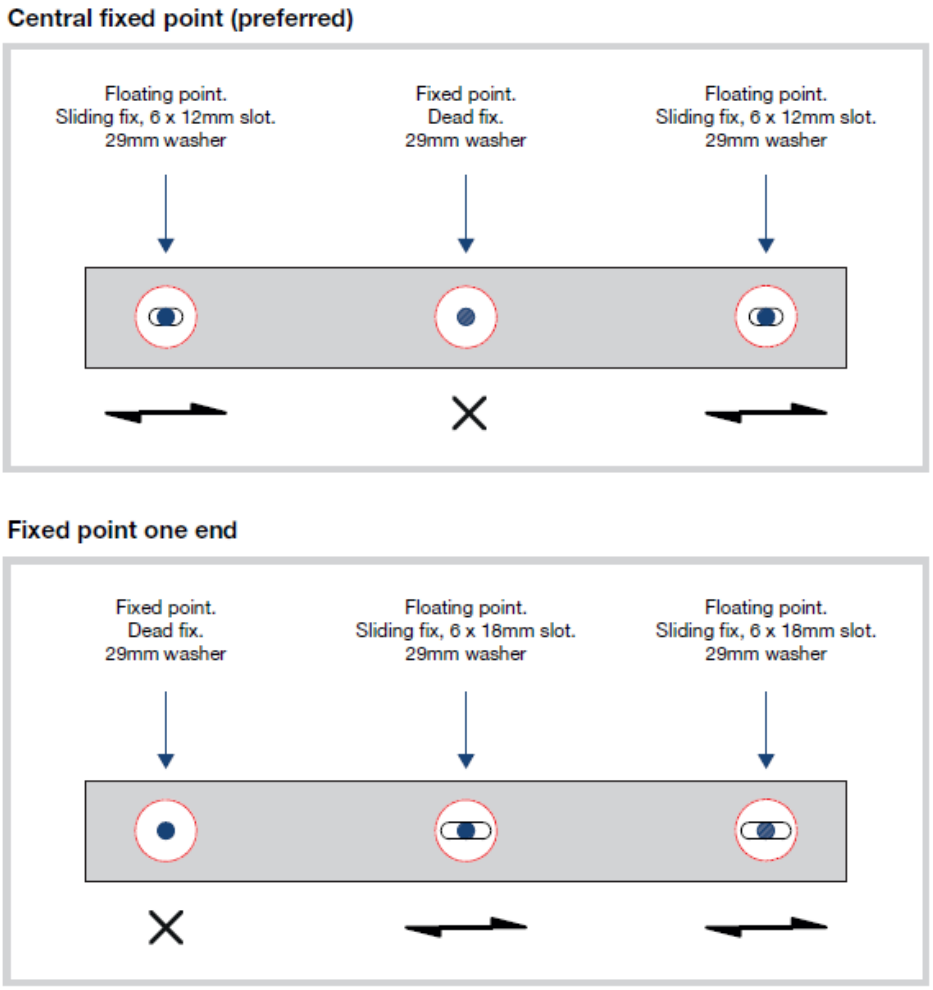

Figure 1: Examples of fixed and floating point

Sealants are also an important consideration; experience has shown that the performance demanded of sealants in confined joint sizes in aluminium fabrications is very demanding and that the use of a secondary weatherproofing layer on the underside of the fabrication is prudent.

MCRMA member companies can advise on the suitability and performance of materials, systems and assemblies to ensure that expansion joints and movement in aluminium fabrications and flashings are calculated properly and specified accordingly. In all instances, it is essential to involve the fastener and sealant manufacturers in the flashing joint design and fastener specification. In addition, design information can be obtained from any of the independent roofing and cladding inspectors featured on the MCRMA web site at www.mcrma.co.uk.

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