



Guidance document GD 07

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INSTALLATION AND QUALITY OF WORKMANSHIP

The success of the envelope is highly dependent on a number of factors, not least of all the accuracy of the steel frame. Historically, there has not been enough collaboration between sub-contractors resulting in the steel frame being erected out of tolerance; refer to *P346 Best Practice for the Specification and Installation of Metal Cladding and Secondary Steelwork* (Steel Construction Institute, January 2007). Purlins and rails often sag and twist even without or before the increased weight of additional insulation or panels. This could be intensified with poor workmanship of the steelwork upon which the roofing and cladding is to be mounted.

To ensure roof and wall cladding systems perform well for the intended life of the building, they must be designed to be functional in terms of keeping the weather out, the heat in (low air permeability) and be durable for the design life of the building. This should be done by selecting products and components that are compatible with one another; for instance using stainless steel fasteners with aluminium, rather than carbon steel.

Over the years, many roofing and cladding contractors have accepted badly installed or incomplete steelwork due to programme constraints or other criteria out of their control. In most, if not all, cases this exposes problems such as unlined, unlevelled and incomplete structural connections resulting in out of tolerance steelwork. This will impact on achieving a satisfactory standard of workmanship for the roofing and cladding, whether single ply, composite, twin-skin or standing seam.

The following images represent some of the issues facing roofing contractors today



Image 1: Undulating/out of position purlin

Undulating/out of position purlins (image 1) occur when the steel frame is erected at varying heights from rafter to rafter. In this case, rafters are faceted to suit a self-curved twin skin roof cladding system and varying heights of cleats are welded to the faceted rafters to achieve the required curvature. Clearly, a difference in height of the rafters / cleat positions does not achieve the correct purlin lines throughout the roof construction.



Image 2: Incomplete structural connections

In image 2, the apex connection of the rafters had been left incomplete as above, and then subsequently handed over to the roofing contractor to commence installation of the roof cladding.



Image 3: Incomplete structural connections

Hip purlins not connected at hip rafter cleats; this not only affects structural capabilities but in addition, there are no structural 'cleaders', which are required to ensure non-fragility of the roofing assembly and an air tight junction being achieved. Purlins locations on hip rafters need consideration as they can clash with the internal gutters as is evident in image 4 below.



Image 4: Purlin/gutter clash

Publication of the recast Energy Performance of Building Directive and proposed amendments to national building regulations inevitably bring new design challenges. The above issues can only be exacerbated by new systems with the additional insulation, becoming bulkier and heavier and as a result more difficult to install correctly.

Although increasing the thermal performance of roof and wall cladding systems should, in theory, increase the efficiency of a building this is not always the case. Regardless of the strength of a system if it is not installed or used correctly then the desired improvements will simply not be achieved, as the performance of roof and wall cladding systems rests highly on the standard of site practice.

While systems can be designed to accommodate a degree of steelwork tolerances, if the standard of workmanship of the steelwork is poor the cladding system will not perform.

It is essential that all sections of the roof and wall systems are installed in conjunction with the manufacturer's recommendations. To guard against poorly installed cladding, MCRMA recommends that all installations are undertaken by trained operatives who understand the benefits of getting it right first time.



Image 5: Primary and secondary steelwork properly installed

Consideration must be given to all aspects of the cladding installation including;

- Adequately sealed air barrier to limit air leakage.
- Correctly installed roof systems, including sealants, fixings and minimum edge distances to ensure non-fragility on roof assemblies.
- Correctly installed fixings: in to purlins/rail, not fresh air. Not under or over-driven which ensures weather-tight washers.
- Continuous insulation: if using man-made mineral fibre ensure no gaps between rolls and no gaps beneath spacers. With insulated panels or insulation boards guarantee tight abutments with no gaps and site-applied foam as necessary.
- Limiting cold bridging: insulate and seal properly.
- Clean down and remove any swarf or detritus that can cause premature degradation.
- Adequately lapped, fixed and sealed flashings.
- When working on a roof, do not walk along flashings, as this will cause damage and will compromise seals.

Examples of good installation and workmanship



Image 6: Roof cladding



Image 7: Wall cladding

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