



The Building Envelope Authority

MCRMA PUBLISHES GUIDANCE TO FASTENERS FOR METAL ROOFING

The Metal Cladding and Roofing Manufacturers Association (MCRMA) has published guidance document GD33 *Fasteners for Metal Roof and Wall Cladding: Design, Detailing and Installation Guide* which gives a comprehensive practical guide on the selection, use and performance of fasteners designed for popular metal roofing and cladding systems used in modern industrial, warehouse and commercial buildings.

All roofing and cladding systems adopting profiled metal as the external surface, usually steel or aluminium, rely upon primary mechanical fasteners to secure the system to the structure and secondary fasteners, which are used to secure junctions and attach flashing and fabrication. The importance of the correct selection of such fasteners is often underestimated by those involved in the various stages of the design and installation process.

The guidance document offers an explanation about each type of fastener used during the construction process and how the various types of fasteners including self-drilling, self-tapping, riveting and grommet variants are used to provide optimum performance. Performance criteria is also explained and functionality is divided into the four main categories covering durability, weathertightness, aesthetics and structural.

Material specification is a key factor which must be considered during the design and development process as it has an influence on each of these four categories in particular, durability. A fastener must have a level of durability compatible to the intended functional lifespan required of the selected cladding system in the particular application.

Fasteners are available in a number of materials all of which offer different levels of corrosion resistance and durability when exposed to a variety of conditions, both external and internal.

BS EN ISO 12944-2 *Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Classification of environments* gives guidance on atmospheric environments which are classified into six atmospheric-corrosivity categories and table 2 in the document provides informative examples of typical environments for each of the categories.



Powder-coated, high performance A4 (grade 316) stainless steel fasteners were used in the creation of 'The Bund' at Salford Quays. Image courtesy SFS Group Fastening Technology

Normally the weathertightness requirement of fasteners relates only to exposed external fasteners. However, the ability of a fastener to maintain a seal is often required on certain internal fasteners where the restriction of air and vapour diffusing into the system is desirable or to meet air permeability requirements within the Building Regulations.

The ability of a fastener to re-seal holes made in the cladding profile depends primarily on the design and performance of a compressible sealing element. The sealing element must be resilient to the mechanical forces to which it is subjected during installation of the fastener, the clamping and service loads in use, as well as the environmental and mechanical conditions encountered during its service life.

The washer compression will also provide a visible indication of the correct installation of the fastener and assist in preventing overdriving (or under driving) the fastener. The key to correct fastener installation and therefore achieving optimum performance lies in the selection and use of tooling appropriate to the fastener type and application. Guidance on the correct installation speeds, end loads and sockets/drive bits for the differing fastener types is explained and is also available from the manufacturer.

It must be noted that Impact drivers should be avoided as they are generally not suitable for self-drilling or self-tapping fasteners and MCRMA GD32 *Self drilling fastener installation tools* should be referenced for specific guidance on this subject.

In addition to satisfying the durability, weathertightness and aesthetic functional requirements, the fastener also has to be capable of withstanding a wide range of types of loading. Some types of loading apply to virtually all metal cladding fasteners regardless of their application, whereas some loadings are specific to the system in which the fastener is incorporated.

The loadings which apply to most fasteners include:

- Tensile loads - pull-out and pull-over resistance
- Shear loads - shear force resistance
- Installation loads - overdrive resistance
- Clamping loads- firmly securing the material to the support or clamping material to material.

A structural engineer should, at the design stage, advise on the loading condition applicable to each area of the building and in addition individual elements, such as fabrications and groups of fasteners. The loading calculation should form the basis for selecting the type, position and number of fasteners at each location on the building.

Manufacturers are best placed to offer advice about their particular products and any variation from their published data during the design or construction process could result in the component or system failing prematurely or not complying with the guarantee or warranty conditions. In addition, design information can be obtained from any of the independent roofing and cladding inspectors featured on the MCRMA web site.

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01633 895633 info@mcrma.co.uk www.mcrma.co.uk