INSTALLED TOLERANCES IN FOCUS

MCRMA has produced a new guidance document GD27 *Installed tolerances: best practice design guide* which is intended to make the cladding sub-contractor aware of the relevant tolerances that are allowed in the fabrication and erection of the main steel frame and in particular the relevant parts of the British Constructional Steelwork Association (BCSA) Publication No. 52/10.

The cladding installer is often left to overcome an out of tolerance structure, compensating for the shortcomings of installation by others, and yet required to deliver a performing and aesthetic cladding. The guidance document illustrates how deviation from these tolerances can affect the performance of not only the cladding system and its fixings but also of associated components such as gutters and flashings and also of any possible contractual issues.

Structural steelwork is subject to permitted deviations in its fabrication and erection which are detailed in BCSA Publication No. 52/10. In addition, guidance on manufacture and installation tolerances for secondary/light gauge steel sections can be found in MCRMA document GD24 and SCI document SCI P346.

The secondary cladding supports are also subject to tolerances, albeit there is very little available guidance on specific erection tolerances in the UK. Because the secondary supports are connected directly to the main steel frame any out of tolerance within the structure will be transmitted to the secondary supports, and in turn, to the cladding and its fixings, which are fixed directly to the secondary supports and are not packed off them to achieve line and level.

A problem can arise where both structural restraint and packing are required, and with packing, is where the lateral stability of for example, a purlin depends upon the liner panel being in contact with and being fixed directly to the top flange of the purlin.

This is not to be confused with purlin sag down the slope (where, if excessive, fixings from items such as liner panels and spacer brackets in built up roof systems, or composite panels, may miss the purlin flange).

Certain cladding systems such as a standing seam system can be more affected by out of tolerance than other systems, where, for example, any excessive undulations in adjacent purlin levels can affect the nesting and hence structural integrity and weathering of the system.

The importance of ensuring that bolt-on purlin cleats are installed within acceptable tolerance and how failure to do so can cause a rotation of purlin flanges and the consequences of unacceptable twist on cladding are dealt with in section 4.5 of MCRMA GD 24; similarly with welded cleats and the tolerance is approximately 1° from vertical which is the recommended rotation tolerance.

Another potential problem of purlin cleats not being within permitted tolerance along a rafter, where up to ± 5mm of tolerance is permitted with regards to the cleat position on the rafter, is that many composite panels require a minimum end bearing of 10mm onto a purlin and this out of tolerance combined with sag of the purlin down the slope can adversely affect end laps and bearing of the panels onto the purlin.

Gutters are always fixed either directly or indirectly (via brackets) to the purlins, which in themselves are allowed a certain acceptable amount of deflection (see MCRMA GD 20), which can result in ponding water in the gutter, and this can be exacerbated say in the case of a valley gutter if a column is out of inclination tolerance affecting rotation of adjacent rafters and, hence eaves purlins (see section 9.6.3.3 of BCSA 52/10).

Excessive deviations in steelwork tolerance can also adversely affect the ability of the cladding to provide the necessary degree of airtightness and aesthetics. Therefore it is important that the installation and deflection criteria are set at the design stage and implemented at the construction stage to ensure that all elements of the construction perform as expected and also that the interface, interaction and fit between components and systems meet with expectations.

Without these criteria, the building will not perform correctly and the installation and attachment of component parts by follow-on trades will be compromised. Follow-on trades which are contractually responsible for accepting the condition of the earlier works prior to commencing the installation of subsequent components must ensure that the serviceability states and deflection criteria meet the design parameters for their products before proceeding. The document also includes guidance on contractual requirements and recommendations for checking on site.

Adoption by industry of the guidelines outlined both in this document and the documents listed at the end of this article will lead to better and more consistent standards of metal roofing and cladding construction.

MCRMA member companies can advise on the suitability and performance of materials, systems and assemblies to ensure that the installation and deflection criteria are calculated properly and that the cladding and components are specified accordingly. 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

References:

BCSA publication 52/10 *National Structural Steelwork Specification for Building Construction 5th Edition CE marking version*

MCRMA GD 20 *Guidance document on serviceability states and deflection criteria*

MCRMA GD 24 *Installation of purlins and side rails*

MCRMA GD27 *Installed tolerances: best practice design guide*

SCI document SCI P346 *Best practice for the specification and installation of metal cladding and secondary steelwork*.

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