THE FACTORS TO CONSIDER WHEN INSTALLING PV PANELS

Photovoltaic panels are routinely being specified and installed on domestic and commercial properties either as a safeguard against rising energy costs, to improve overall carbon emissions for Building Regulations or for other compliance reasons.

Further reductions in building target CO_2 emission rates are becoming increasingly difficult to achieve in a cost-effective manner through building envelope and service enhancements alone and therefore the installation of renewable technologies such as photovoltaic systems can form part of a cost effective approach to building regulation compliance.

Lightweight Solon PV module bonded onto a Trisomet roof panel

Large buildings such as distribution and retail premises often have large clear roof areas which are ideal for PV installations. When considering installing a PV system, the specifier needs to be aware of how the system can impact on the building structure and cladding.

One of the first considerations is the structural capability of the existing roof covering and primary structure. Renewable energy technology systems can in themselves add a considerable additional dead load onto the roof and, in many cases, local geographical conditions can adversely influence both positive and negative wind loads.

A study of a range of new-build portal frame buildings and PV systems indicate that the additional loads from the PV panels may require the portal structure to be increased by up to eight per cent.

For retrofit installations, the Metal Cladding and Roofing Manufacturers Association (MCRMA) recommends that an appropriate structural survey be undertaken to ensure that the existing structure can support the additional load.

There are a wide range of PV systems and support structures available on the market resulting in additional imposed weights between 10 and 30Kg/m^2. The choice of system can be significant both in terms of the area of PV panels which can be installed and the requirements to increase the structural frame size.

The effects of wind loading also needs to be considered as PV panels can create additional wind loading, particularly if they are installed on inclined frames to improve operating efficiency. Increased wind loadings will be greatest around the perimeter of an array and in particular at the corners. Further guidance on this can be found in BRE publication DG489.

The area underneath the PV panels is not subject to natural rainfall which can lead to a build-up of debris and airborne salts. Furthermore, this area is not exposed to solar radiation and the reduced air movement which can lead to an increased time of wetness in environments such as in the United Kingdom.

Area of cladding under a PV panel showing the build-up of dirt and algae

The air space underneath the PV panels can be significantly warmer than freely exposed cladding and, when combined with increased time of wetness, may generate a more humid corrosion environment and promote mould and algae growth. Leaves and other matter can become trapped in the cavity under the panel and may form a damp poultice with increase local corrosion. If the material is allowed to build up it can reduce water run-off and could result in water penetrating the cladding through end or side lap joints.

Specifiers need to take into account the potential for localised corrosion underneath PV panels. It is essential to understand the implications of the PV array on the guarantee for the roofing material and specify a material with increased durability that is available with an application specific guarantee such as offered by Tata Steel which has carried out an assessment of the conditions underneath a PV array.
Tata Steel's Colorcoat® products offer the optimum combination of corrosion resistance, UV resistance and temperature stability, backed by a guarantee for use with PV systems.

Areas of roof cladding with a PV array installed should be subject to routine inspection, maintenance and cleaning and therefore safe access to the PV system and roof cladding must be considered as part of the installation. A roof cladding system which has been tested according to the Advisory Committee for Roofsafety's publication, *ACR(M) 001- 2011:Test for non- fragility of profile sheeted roofing assemblies* and is classified as non fragile will significantly reduce the risk to personnel on the roof.

In addition, specifying a roof cladding system which is classed as "walkable" will reduce the risk of damage from foot traffic on the roof. The PV array should be zoned with clear areas to allow personnel access and consideration must also be given to ensure that safety line systems have been installed to allow safe access to all areas of the installation.

PV installation in progress on Deeside Leisure Centre

Metal roofing systems in conjunction with renewable energy technology systems provide a sustainable and environmentally sensible solution which with due consideration can provide an economic and trouble free installation. MCRMA members offer a range of solutions and recommend that a proposed scheme should be fully evaluated at the early stages by any of the independent roofing and cladding inspectors whose details can be found on the MCRMA web site at www.mcrma.co.uk.

This article was prepared on behalf of MCRMA by Ian Clarke, Application Development Manager, Tata Steel. This article first appeared in RCi Magazine February 2014

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