Meet the Team

Oriola Davies  
BEng, MSc BS, ProfGradIMM

Oriola is a qualified and experienced Mechanical Engineer (BEng) who joined the BBA in 2008 as a technical trainee in the Construction Products unit of our Certification department, and has since grown in her role to become Team Manager for the External Wall Insulation Systems (EWIS) team and a BBA identified Technical Expert. Oriola is an active member of the EOTA/ETICS working group and has considerable knowledge in construction product certification.

Fernando Ferrarin  
BEng, MEng

Fernando is a qualified Civil Engineer with a Master’s degree in Civil and Urban Engineering. He worked as a Site Engineer and Quality and Sustainability manager before joining the BBA in 2017 as a Project Manager in the Engineering unit of our Certification department. Fernando brings with him professional expertise in quality and sustainability certification and experience working in consultancies across America and Europe.


British Board of Agrément  
Bucknalls Lane  
Watford  
Hertfordshire  
WD25 9BA

T +44 (0) 1923 665300  
www.bbacerts.co.uk  
clientservices@bbacerts.co.uk

BBA (EU) Certification Limited  
46 Blackburne Square,  
Rathfarnham Gate,  
Rathfarnham,  
Dublin 14  
D14 V4F1 Ireland

© 2019 British Board of Agrément. All Rights reserved. PAC001

Resistance to wind load

Technical case study  
By Oriola Davies (BEng, MSc BS, ProfGradIMM)  
& Fernando Ferrarin (BEng, MEng)

By Oriola Davies (BEng, MSc BS, ProfGradIMM)
& Fernando Ferrarin (BEng, MEng)

Resistance to wind load

Technical case study

By Oriola Davies (BEng, MSc BS, ProfGradIMM) & Fernando Ferrarin (BEng, MEng)

Oriola Davies (BEng, MSc BS, ProfGradIMM) & Fernando Ferrarin (BEng, MEng)
Avoiding external insulation failures

It is essential to assess external wall insulation systems for their ability to resist wind load and prevent installation failure. External wall insulation systems (EWIS) comprise insulation material that is mechanically or adhesively fixed to a substrate of a building's external wall. Various types of render, such as silicone, acrylic, mineral render and decorative finishes, including paint or stone finishes, are then bonded to the outer face of the insulation boards or slabs.

Installation implies the thermal performance of new and existing buildings and, therefore, the safety of occupants, to avoid any injury or death due to the exposure to wind pressure. The design wind load is the most important feature for users, the structural stability of the system is often overlooked by the non-technical community. This article therefore examines the potential issues and unintended consequences of EWIS design in relation to wind-load resistance.

To address the growing market for EWIS, the UK construction industry has been challenged to improve its design, detailing and installation, including the specification of ancillary components, pre-installation procedures, the quality of workmanship and training of installers. The industry needs to work alongside suppliers, installers and consumers to provide advice and guidance on EWIS behaviours that might lead to unintended consequences from poor installation.

Although thermal performance is the most important feature for users, the structural stability of the system is often overlooked by the non-technical community. Recent exports of EWIS structural failures worldwide have raised technical awareness regarding systems’ resistance to wind load. The collapse of GWI (2015) which is often referenced with heavy finishings from the external walls of high-rise buildings can cause property damage, serious injury and fatalities.

There have been various circumstances, albeit few and between, where entire sides or sections have detached from a building’s facade after exposure to severe rain and wind loads. This phenomenon is known as ‘windblasting’, where entire sections have detached from a building, and can be caused by rain and wind loads acting on the building’s facade after exposure to severe rain and wind loads.

Design and installation defects such as deficient structural calculations, specification of unsuitable materials, components and weather exposure during installation also reduce the service life of the system. It is important to consider the resistance of EWIS to negative wind loads by understanding the mechanism by which they resist the applied static and dynamic loads.

Negative wind load—this is wind suction on the external face of the system—is the most undesirable lateral load. The design wind loads on the different zones of the building’s facade must be calculated taking into account the different conditions, such as location and topography, in accordance with the Eurocodes (BS EN 1991-1-4: 2010 and BS EN 1996-1: 2005). In the UK National Annex, the design wind loads are calculated in line with the Building Regulations.

The resistance to wind load depends on the system and firing method. An excessive number of mechanical flanges can produce cold bridges, leading to reduced thermal performance. In turn, inadequate flanges allow in reverberant patterns which can induce structural failure, when the loads are high enough do not match the assumptions made in the calculations.

It is essential to assess external wall insulation systems for their ability to resist wind load and prevent installation failure. Design resistance of EWIS to negative wind loads is determined either by a full-scale wind-suction test—a test that simulates the wind pressure applied to the building’s facade under the wind-suction test conditions, as the dynamic wind uplift (DWU) test or by structural calculation defining the resistance of the contributing components. The Eurocode (BS EN 1990) defines, for the structural calculation, its wind resistance, as the design wind load, calculated in accordance with the Eurocodes (BS EN 1991-1-4: 2010 and its UK National Annex).

The design wind loads on the different zones of the building should be assessed and applied throughout the installation. The design wind loads must adequately resist and safely transfer the calculated loads to the structure, accounting for all possible loading scenarios. The system must adequately resist and safely transfer the calculated loads to the structure, accounting for all possible loading scenarios. The system must adequately resist and safely transfer the calculated loads to the structure, accounting for all possible loading scenarios.

The supporting structure—that is, the external wall—should be able to carry the additional load that may be imposed by the installation. The substrate and supporting structure must be able to accommodate any additional load that may arise from the installation. The substrate and supporting structure must be able to accommodate any additional load that may arise from the installation. The return of the weather and wind environment, as well as the structural load, are critical factors in determining the stability of the building. The system tested, resulting in the maximum pressure (Q) in a large sample area. This attained resistance cannot be surpassed by the particular requirements.

To address the growing market for EWIS, the UK construction industry has been challenged to improve its design, detailing and installation, including the specification of ancillary components, pre-installation procedures, the quality of workmanship and training of suppliers, installers and architects. This training provides technical guidance on understanding and applying the design data in the certificate, thus helping to address the issues associated with the systems structural calculation. For example, there are no obligations to adopt the systems proposed by the guidance on EWIS, certificate holders, following the principles of design guidelines for satisfying part A of the Building Regulations.

When designing an EWIS system, users must ensure that the system is resistant to wind load, both temporary and permanent, and able to transfer all resultant additional loading to the ground in a satisfactory manner. The simplicity of the substrate and supporting structure must be such that the system is not affected by wind pressure applied to the building’s facade, as the system must comply with the Code of Practice 265, BS 5250 and Eurocode 5.

“The importance of structural integrity and safety during the system lifespan, the British Board of Agrément (BBA) has revised every current EWIS certificate regarding its strength and stability, and promoted a training course on wall-load resistance available to certificate holders, suppliers and architects.”

“Products Approval and Certification” is the most important feature for users, the structural stability of the system is often overlooked by the non-technical community. This article therefore examines the potential issues and unintended consequences of EWIS design in relation to wind-load resistance.

To address the growing market for EWIS, the UK construction industry has been challenged to improve its design, detailing and installation, including the specification of ancillary components, pre-installation procedures, the quality of workmanship and training of suppliers, installers and consumers to offer guidance and support on EWIS industry needs to work alongside suppliers, installers and consumers to offer guidance and support on EWIS. This article therefore examines the potential issues and unintended consequences of EWIS design in relation to wind-load resistance.

“Although thermal performance is the most important feature for users, the structural stability of the system is often overlooked by the non-technical community.”

“The importance of structural integrity and safety during the system lifespan, the British Board of Agrément (BBA) has revised every current EWIS certificate regarding its strength and stability, and promoted a training course on wall-load resistance available to certificate holders, suppliers and architects.”

© 2019 British Board of Agrément. All Rights reserved.