DCLG Summary of the British Board of Agrément (BBA) report into design calculations for external wall insulation systems

Introduction

This note summarises the information provided to the Department in confidence by the British Board of Agrément (BBA) in relation to failures of a rendered cladding system which the BBA investigated and which led the BBA to investigate more widely design calculations for external wall insulation (EWI) systems undertaken by BBA certificate holders. Not all EWI systems are covered by BBA certificates and the BBA investigation did not cover non BBA certificated systems.

The BBA is the UK’s leading Certification Body for products and systems for use in the construction industry. According to BBA’s Articles of Association, the objects for which it was established include ‘to provide reassurance to manufacturers, users, specifiers, insurers and regulators of construction products and systems and to encourage the safe development and adoption of innovative construction solutions.’ Since its formation in 1966, BBA has issued over 5,000 certificates. The BBA has 38 EWI certificate holders with over 140 different systems certified.

Background from executive summary

BBA were made aware in 2016 of the structural failure of a rendered external wall insulation (EWI) system on a residential tower block over 75m high which led to a substantial area of render falling from the building. No one was injured but the failure clearly presented a risk to public safety.

Further inquiries indicated two other buildings in the same complex had suffered similar failures, again without causing injury. BBA was not in a position to be able to investigate the specific cause of these specific failures, but identified a general issue with the adequacy of structural design of EWI systems.

Subsequent to these investigations, BBA engaged with certificate holders to identify any other instances of failure and started to evaluate how installers were undertaking structural design for wind loading and fixing of rendered external wall insulation systems.

BBA certificates

Currently the BBA has 38 External Wall Insulation (EWI) Certificate holders with over 140 different systems certificated. Use of a BBA certificate is not a regulatory requirement and as a result, not all EWI installations will be carried out by BBA certificate holders.
These systems include a variety of designs because of the different types of substrate, fixing methods, insulation materials and finishes that may be involved. Designers should choose the right system for each installation using information in the BBA certificate. Systems must be installed fully in accordance with the certificate in order to perform as described. Installation must be carried out by contractors who have been trained and approved by the certificate holder.

EWI systems are fixed to the substrate wall using mechanical fixings or bonded by adhesive or, more commonly, by a combination of the two. Certificates include a description of the fixing method approved for each system and provide guidance on the relevant design principles and specific test information for the system. BBA certificates make it clear that a site specific assessment must be made in each case, using the design information given in the certificate and applied to the unique circumstances found at the site in question.

In terms of structural integrity, the design of an appropriate EWI system involves two stages: the calculation of the wind loads acting on the specific installation in accordance with the relevant Standards and conventional good engineering practice, followed by the selection of an appropriate system capable of withstanding the identified loads.

There may be several parties involved in the design and installation of the system, which may contribute to a lack of clarity regarding who assumes the ultimate responsibility for providing design calculations. The BBA expects certificate holders to be responsible for ensuring that the design process is carried out correctly and the certificate wording has graduated towards this position over time such that the current standard text reflects this expectation.

Satisfactory installation of EWI requires both the generation of a suitable design solution for the selected system for the specific site in question, and that the installation is carried out fully in accordance with the specification developed from this solution. The BBA investigation focused exclusively on the design solutions and did not consider installation related matters.

**BBA Expectations**

The BBA expects that its certificate holders should have a written policy setting out the process to be followed; a procedure for assessing wind load calculations; a nominated person responsible for the policy; a method for recording information for each project; a procedure to ensure competency of the person undertaking wind load calculations and system design; a wind loading calculation for each project.
The wind-loading calculation should:

- Be site specific using BS EN 1991-1-4 and UK National Annex taking into account as a minimum location, building dimensions, height, site altitude, building wind pressure zones for each elevation, topography and orography.
- Demonstrate adequate resistance to the ultimate loads applied to the EWI system including all modes of failure appropriate to the specific characteristics of the system as certified and including; a site specific survey with information on substrate suitably for mechanical or adhesive fixings; assessment of fixing pull-out and pull-through data, bond strengths and interfaces; calculation of number and pattern of fixings required or adhesive bond; calculations showing all of these can resist calculated wind load; and a u-value check.

Existing surveillance of EWI installations

In England, the relevant regulatory requirements are set out in Part A of Schedule 1 of the Building Regulations. Statutory guidance to support the requirements is set out in Approved Document A (https://www.gov.uk/government/collections/approved-documents). Approved Document A includes a specific section on cladding including guidance on wind loading calculations.

EWI installations would also need to ensure compliance with other relevant regulatory requirements, including Part B (fire safety), Part C which covers risks associated with moisture, and Part L (conservation of fuel and power) of the Building Regulations. The Devolved Administrations have their own requirements.

As well as Building Regulations, there are other requirements relevant to the installation of EWI supported by the Energy Company Obligation, the current government support scheme for domestic energy efficiency. These include:

- Publicly Available Specification 2030: 2014 Edition 1 (‘PAS 2030’) which specifies the installation processes, service requirements and process management for a suite of energy efficiency measures (including EWI installations). PAS 2030 includes the minimum technical competencies required of a technician to install under ECO.
- PAS 2031: 2015 Certification of energy efficiency measures installation in existing buildings and assessment requirements for certification bodies on the basis of 1% of installation per annum per installer.
- Neither PAS 2030:2014 nor PAS 2031 placed a requirement on certification bodies to assess adequacy of design. However, PAS 2030 was revised in early 2017 and it now includes a detailed pre-installation inspection checklist covering a mandatory survey and detailed design.
Conclusions

The BBA investigations have found important shortfalls in practice in a number of key areas of EWI design, including: inadequate calculations of wind loads and wind resistance of products being used; failure to consider properly bond strengths between insulation and render; lack of appreciation of the need for site specific assessments, rather than reliance on generic assessments; inadequate quality assurance processes. There was also a concern that lack of provision of information might suggest inadequate levels of knowledge as to the scope and contents of design calculations for an EWI system.

Following investigation and discussion with its certificate holders, the BBA concluded:

- There is evidence of widespread significant deficit in essential knowledge necessary to calculate wind-loads that can act on EWI systems and in particular a lack of knowledge of modes of failure and safety factors.
- This remains true in many cases where design calculations were outsourced to consulting engineers.
- This knowledge deficit is likely to be industry wide.
- There must be concern that some existing EWI installations are inadequately designed.
- As a result it is more likely than not that some EWI installation may fail prematurely.
- Independent oversight of adequacy of design of EWI systems appears necessary but currently formally lacking.
- The above shortcomings need to be addressed immediately.
- All those working on EWI installation need adequate design policies and procedures

Response

The BBA has:

- Taken action to liaise with certificate holders to establish procedures and calculation methodology for all future designs covered by BBA certification.
- Revised all relevant BBA certificates to include all of the data required in order to carry out necessary design calculations.
- Developed a detailed Guidance note on design process and calculation methodology.
- Delivered technical briefings to support understanding.
- Considered an additional post certificate surveillance regime.
The BBA investigation also raises wider implications about addressing the risks of external wall failures for consideration by Government and industry. The BBA have recommended further areas of action with their certificate holders:

- All BBA certificate holders should adopt revised procedures set out in revised guidance notes.
- BBA certificate holders should undertake risk assessment of all buildings that incorporate their certificate EWI systems.
- Certificate holders should then consult with any affected property owners about appropriate corrective actions required to mitigate potential sources of system failure.

More widely the conclusions of the investigation are that future and historical risks of EWI systems need to be addressed more broadly; Government should consider the implications of the findings of the report for non BBA certified installations; changes may be needed to relevant regulations and guidance; and consideration should be given to arrangements for oversight and checking.

**The Department’s Response**

Having been alerted to the issues, the Department wrote to building control bodies on 13 July drawing their attention to the requirements of Building Regulations where recladding work is proposed, including specific reference to the requirements on wind loading design calculations as required in Approved Document A guidance. A further more detailed letter specifically on wind loading calculations was sent to building control bodies on 5 September ([https://www.gov.uk/government/publications/wind-loading-calculation-for-cladding](https://www.gov.uk/government/publications/wind-loading-calculation-for-cladding)).

The Department has also taken the advice of the Expert Panel and the Standing Committee on Structural Safety on the issues raised. On the basis of that advice, the Department is issuing further guidance for building owners on identifying potential risks of EWI failures alongside this report, and also intends to review the relevant guidance in Approved Document A *Structure*.

More generally, the Government has set up an independent review of Building Regulations and fire safety, being led by Dame Judith Hackitt. Although focused on fire safety and high rise, multi-occupancy buildings, the review is looking at issues such as compliance checking and quality assurance, which are relevant to the general issues raised in the BBA’s investigation.