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BUILDING REGULATIONS

CLADDING OR RE-CLADDING OF BUILDINGS

BACKGROUND

Following the Grenfell tower fire, building designers and installers are likely to be paying particular attention to cladding of buildings. Building owners may also be reviewing existing cladding on their buildings with support from building professionals.

Further information on testing of Aluminium Composite Materials and the UK government's building safety programme can be found at www.gov.uk/guidance/building-safety-programme.

A separate recent investigation has re-emphasised the need to properly assess wind design calculations for cladding systems, particularly for high rise buildings and buildings in exposed locations. This follows investigations into recent incidents of failure in the UK.

PURPOSE

The purpose of this Information Note is to flag common building regulations issues to consider when reviewing cladding work or where cladding systems are to be renewed or replaced, particularly on tall buildings (e.g. above 18 m in height).

This note does not give advice on the technical requirements in the Building Regulations as these are matters covered by [Technical Booklets \(TBs\)](#).

REPLACING INDIVIDUAL OR SAMPLE PANELS

In assessing the safety of an existing cladding or external wall insulation (EWI) system, it may be necessary to remove isolated panels either to reveal the construction build up or for testing purposes. In doing so, care should be taken not to create conditions which may worsen the integrity of the cladding system. This could include exposing insulation or other materials to rain which can affect structural integrity and water tightness, or leaving material exposed which could reduce fire performance.

Where sample panels are removed, they should be replaced immediately with a suitable material which ensures continued compliance with all the applicable Parts of the Building Regulations.

CLADDING OR RE-CLADDING OF BUILDINGS

If a cladding system is proposed or if building owners consider that they need to re-clad their building, this is very likely to be building work as defined in regulation 2 of the Building Regulations (Northern Ireland) 2012 (as amended) and therefore subject to all relevant requirements of Building Regulations, in particular those relating to: Materials and workmanship (Part B), Site preparation and resistance to contaminants and moisture (Part C), Structure (Part D), Fire safety (Part E), Conservation of fuel and power (Part F) and Ventilation (Part K).¹

Moisture and ventilation

The building structure, insulation and cladding should be designed and installed to minimise risks from moisture. This includes ensuring that alterations to the cladding system protect the structure and substructure from rain penetration. Particular attention should be paid to coping, flashing and drainage details to ensure that insulation material is not at risk of becoming wet and that structural materials are not at risk of rot or corrosion.

Consideration also needs to be given to the risk of interstitial condensation (condensation within the wall/cladding structure) which can result from a change in fabric performance where alternative materials (particularly insulation) are substituted. Guidance is given in Technical Booklet C, *BRE Report 262 Thermal insulation: avoiding risks* and *BS 5250 Code of practice for the control of condensation in buildings*.

Cladding and insulation can make a building more airtight and so reduce the amount of ventilation inside the building. This can potentially lead to condensation, mould growth and ill health. Additional ventilation may be needed and guidance on this is given in Technical Booklet K.

Structural safety

Regulation 30 (Stability)

Regulation 30 in Part D (Structure) of the Building Regulations requires that buildings shall be designed and constructed so that combined dead, imposed and wind loads are sustained and transmitted to the ground safely. If followed, the relevant design codes and standards provided in Section 2 of Technical Booklet D should normally demonstrate compliance with the requirements of regulation 30 for common building situations.

¹ Other parts, such as Part V (Glazing) and Part H (Stairs, ramps, guarding and protection from impact), may be relevant where glazing is used, or depending on the location of the cladding.

Wind loading calculations and structural design of cladding systems

Concerns have been raised about potentially inadequate consideration of wind load and structural design calculations. Inadequate calculations could result in external wall insulation EWI/cladding systems failing due to high wind loads which, on high rise and exposed buildings in particular, gives rise to life safety risks.

Design standards for wind loading calculations are referenced in paragraph 2.2 of Technical Booklet D as BS EN 1991-1-4 2005². Paragraph 2.12 also recognises the withdrawn/superseded BS 6399 Part 2 1997 as an alternative code, however this is only appropriate '*where a designer can demonstrate the appropriate use of this withdrawn standard in the circumstances of the building work*'.³ In most cases the appropriate code will be cited in a current product Agrément Certificate or manufacturer's information for the proposed system.

It is therefore important to consider carefully how wind loadings have been factored into the structural design of cladding systems. The following can be important factors in the assessment of structural design by those responsible for designing and installing the system.

- The design system is demonstrated to be capable of resisting the calculated wind loading.
- Insulation to render bond strength is adequately considered in render systems.
- Design pull-through values are considered and used appropriately.
- Fixing numbers/pattern are correctly specified and defined.
- Design pull out value is correctly calculated at all levels of the building.
- The correct safety factors are applied as set out in relation to the specific system being used.
- The methodology for installation and design is clearly expressed.
- Sufficient detail of the building and its site context is available.
- Sufficient data is available to enable a detailed assessment to be carried out.
- Consideration is given to the need for a detailed site survey to be undertaken including specific pull out and/or adhesion tests.
- Wind pressures zones on the building are adequately described.
- Care is taken to avoid calculation errors resulting in over engineering of the system (which can cause failure e.g. where pull out zones overlap).

Failure to properly take into account each of these factors can mean that the safety factors used during calculation and design to meet anticipated wind loads can be significantly eroded or, in some cases, reduced to zero. Where safety factors are marginalized, only a perfectly installed system will be likely to resist predictable peak wind loads.

² To be read in conjunction with the associated UK National Annex and BS EN 1990

³ Refer to paragraph 2.11 Technical Booklet D

This leads to an increased risk of render systems (or any type of cladding) delaminating or falling from the building. Debris falling from height could pose a substantial risk to life.

It is therefore particularly important that -

1. Design calculations are undertaken by a competent designer in accordance with Technical Booklet D guidance. BS EN 1991-1-4⁴ (or alternatively BS 6399 Part 2, where deemed appropriate) is particularly important in relation to wind loading.
2. Fixing designs should conform with a relevant European Technical Approval (ETA) or a relevant British Standard (e.g. BS 8539 2012).
3. The structural design of cladding systems is rigorously checked by a suitably qualified person.
4. The specific site conditions and nature of the building are fully understood and factored into calculations.
5. Where necessary, site tests are undertaken to assess design pull out and adhesion strength underpinning design assumptions.
6. There is adequate site supervision and inspection to ensure that the system is installed in line with the system design.

Replacement cladding elements

In some circumstances remedial measures may be proposed, due to concerns about existing cladding. Replacement cladding may be heavier than the existing system and cladding panels, or insulation materials, may have a lower resistance to fixings pulling through than the original panels. For example, replacement insulation may be heavier, particularly if it can absorb water (e.g. from rain during installation or rain penetration through the outer cladding). In addition, removal of the original panels may damage fixings, the fixing system or the building substrate.

If fixings or a fixing system is to be reused, the original design and the suitability for the new application should be checked. This should include an assessment of resistance to wind loads, as above. It should not be assumed that the original fixing system remains adequate as there is always a risk that the original system was not designed or installed correctly. The fixing system should take account of the condition of the building substrate and performance in a fire.

⁴ To be read in conjunction with the associated UK National Annex and BS EN 1990

Fire safety

The requirements of Part E will apply in respect of cladding/re-cladding and guidance in paragraphs 4.36 and 5.1 to 5.4⁵ of Technical Booklet E is particularly relevant. This notes that;

- Cavity barriers should be provided in line with paragraph 4.36 to 4.43 to close the edges of cavities, around openings, and in line with every compartment floor and wall.
- External surfaces should meet the performance set out in Diagram 5.1.
- Where the building has a storey the floor of which is 18 m or more above ground level, any materials used for supporting cladding and any insulation material incorporated within the wall construction should be of limited combustibility (as defined in paragraphs 1.9 and 1.10 of Technical Booklet E - e.g. Class A2 to BS EN 13501-1).

Alternatives to the guidance in Technical Booklet E.

- Compliance via a BR 135:2003/2013 and full scale test data from BS 8414 - 1 or - 2 is not offered as an alternative solution in Technical Booklet E unlike the guidance in other regions of the UK. However, cladding systems (including any necessary compartmentation and cavity barriers) shown to meet all the performance criteria by this alternative solution may be acceptable, provided suitable consideration has been given to all aspects of the test performance report and the particular circumstances of use in the building; or
- Where directly applicable BS 8414 test data is not available and a proposal for cladding or re-cladding a building includes, as an alternative to compliance with Technical Booklet E, an assessment of performance for a system, this should be checked rigorously. Guidance in this respect is available in *Guide to Undertaking Assessments In Lieu Of Fire Test* published by the Passive Fire Protection Federation:

http://pfpf.org/pdf/publications/guide_to_uailoft.pdf

Further information is available in BRE report BR 135 (2003 or 2013) and in *Building Control Alliance (BCA) Technical Guidance Note 18: Use of Combustible Cladding Materials on Buildings Exceeding 18 m in Height*.

⁵ A reference is made to BR 135:1988 in paragraph 5.4 of Technical Booklet E. This is for advice only as opposed to guidance required to be adhered with if following the solution of TBE. Updated advice incorporating performance criteria to the full scale test of BS8414-1 or -2 is available in BR 135:2003 or BR 135:2013 and may be more useful.

Conservation of fuel and power

Where an external wall, roof or (ground) floor is being renovated, regulation 43 of the Building Regulations (Northern Ireland) 2012 (as amended) requires it to meet minimum energy efficiency standards where that is technically, functionally and economically feasible. Technical Booklets F1 and F2 provide guidance and examples on what may be considered technically, functionally and economically feasible.

OTHER STATUTORY PROCESSES

Depending on the nature and extent of works to be undertaken other statutory processes may be affected and require consideration.

Fire and rescue services should be appropriately consulted.

Planning permission may be required (further advice can be found at www.nidirect.gov.uk/articles/planning-permission-when-to-apply).