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Local Authority Chief Executives

Local Authority Heads of Housing

Housing Associations

(copy to: LA Building Standards Managers)

9 November 2017

Dear Chief Executive

## **STRUCTURAL DESIGN OF CLADDING SYSTEMS**

I am writing to you as part of the Scottish Government's on-going building safety programme to make you aware of a risk that has been identified with certain types of cladding systems and to share with you advice and guidance on what action is required.

The contents of this letter and guidance are for the attention of anyone responsible for the maintenance of a building with external insulation finished with render or brick-slips, particularly those with a storey at a height of more than 18 metres above the ground or in an exposed location.

It has been brought to our attention that External Wall Insulation (EWI) systems with a rendered (or brick slip) finish may in some circumstances be vulnerable to deterioration resulting in parts of the cladding system falling from buildings. There is no suggestion in this instance that the overall structural safety of buildings is compromised.

I am not aware of any injuries arising from this problem, but it is important that you note the advice in **Annex A** about cladding systems and **Annex B** about condition surveys, and that you take the appropriate actions to ensure the safety of your tenants and people moving around the buildings for which you are responsible.

### **Next steps**

I have written to all local authorities and housing associations and I will also write to organisations representing private sector building owners. Local authorities should also consider circulating this advice to other relevant building owners in their area.

In order to fully understand the scale of the issue across Scotland's housing stock and to identify actions being undertaken by building owners in the event that any buildings may have inadequate design or poor installation of EWI systems. I would be grateful if you would return the pro-forma schedule, attached to the email, to [BFSResponse@gov.scot](mailto:BFSResponse@gov.scot) by 31 January 2018, so that the issues can be logged. If you are able to provide the required information sooner please do so.

### **Summary of key actions for building owners**

To help, I have provided below a summary of the key actions building owners should take which are detailed in **Annex A** and **Annex B**:

1. Undertake an immediate audit or review of their buildings to identify their height, construction, location and wind exposure.
2. Ensure they have a regime for periodic checking the condition of any EWI system.
3. Identify whether any buildings fit into the relevant categories for buildings that could be affected .
4. For the relevant buildings identified –
  - Undertake a visual condition survey based on non-intrusive inspections and, if necessary, intrusive inspections.
  - Undertake an assessment of the adequacy of the design and installation using suitable expert advisers.
  - Establish what further non-invasive or invasive investigations are needed.
  - If necessary, commission remedial work to address deficiencies in the design or construction of the system, and put in place any mitigating measures.
  - Consider what ongoing inspection regime is necessary.
5. Notify Scottish Government using the pro-forma schedule

If you have any queries regarding this please contact [BFSResponse@gov.scot](mailto:BFSResponse@gov.scot). I thank you in advance for your cooperation in this matter.

Yours sincerely,

**Stephen Pathirana**  
Deputy Director, Building and Fire Safety Coordination Team

## **Annex A**

### **Structural design of cladding systems**

1. All cladding systems need to be designed to resist pressure from predicted wind loads in the location and at the height that they are installed. The fixing system holding the cladding system on to the wall must be adequately designed to deal with predicted loads, including the weight of the cladding system itself. Guidance on how to achieve this is provided in Section 1 Structure of the Building Standards Technical Handbooks which includes undertaking suitable design calculations.
2. Design calculations for EWI systems typically include safety factors to ensure that even where an installation is not perfect, or in the event that unusual circumstances occur (such as high winds), the system will remain safe. This information should be available from system manufacturers. However, evidence submitted to Scottish Government suggests that in some circumstances these safety factors are being eroded by inadequate design (structural calculation methodologies) and / or inadequate installation.
3. Where inadequate design and / or inadequate installation reduces safety factors, cladding systems are more vulnerable to damage from high wind speeds, to other installation defects such as poor water-tightness (which can lead to insulation becoming water-logged and heavier as a result) and to variations in the design and installation quality of mechanical or adhesive fixings.
4. These potential defects increase the risk of cladding becoming detached from the building and falling from height, and this in turn poses risks to life. With rendered, or brick slip EWI cladding systems there is a heightened risk of the render or brick slip layer detaching from the insulation underneath where these defects are present.

### **Which buildings could be affected**

5. Scottish Government is aware of a small number of instances where inadequate design and / or inadequate installation has resulted in cladding falling from tall buildings.
6. Due to the nature of the problems that have been identified this advice is particularly relevant for tall buildings subject to high wind loading due to high wind speeds. Specifically this advice should be followed if you own a building which:
  - Has been clad or over clad with an EWI system; and
  - has a storey at a height of more than 18 metres above the ground.Particularly if the building is in an exposed location.
7. The advice may also be relevant and should be followed if you own any other multi-storey building in an exposed location.

## **Buildings with EWI**

8. It is good practice to periodically check the condition of any EWI system on any building of any height and all building owners should consider the need to undertake such checks as part of their maintenance and management plan.

9. If not undertaken recently, building owners should consider an immediate audit or review of the buildings for which they are responsible, identifying their height, construction, location and wind exposure to determine if the buildings fit into the above categories.

10. It is likely that you will need to seek expert advice from a suitably qualified and experienced person such as a Chartered Structural Engineer or Chartered Building Surveyor. A link to the relevant section of Institute of Structural Engineers and RICS websites are provided below:

<https://www.istructe.org/finding-a-structural-engineer/notice-to-building-owners>

[www.ricsfirms.com](http://www.ricsfirms.com)

## **Exposed Location**

11. There is no prescribed definition of an exposed location but typically this would include buildings in an elevated or hill-top location, seaside locations, areas where the surrounding terrain will not provide sheltering from wind, or a combination of these factors. In dense cities, funnelling will need to be considered, which could increase the wind effect.

## **New External Wall Insulations**

12. In order to ensure risks are mitigated in future installations, the Scottish Government Building Standards Division has written to all Local Authority Building Standards Services highlighting the need to ensure adequacy of structural design and installation in accordance with the requirements of the Building Regulations – the relevant letter can be found at the link below;

<http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/ProceduralLegislation/letterstoverifiers/llavclad>

## **Existing Rendered External Wall Insulation**

13. Steps also need to be taken to assess existing installations. It is recommended that for relevant buildings, assessment should be undertaken to reassure building owners of the structural integrity of their EWI cladding systems.

14. Visual condition inspections may still be advisable for owners of buildings of any height with a cladding EWI system (see below).

15. In general, the key steps for building owners are as follows (further guidance is provided at **Annex B**) however building owners should also take their own professional advice;

- Undertake a visual recorded survey of cladding condition including checking that waterproofing is adequate and that the cladding and insulation is not absorbing moisture (which can increase risk of structural failure). Cladding systems are likely to fail gradually rather than catastrophically, meaning that ongoing visual inspection will also be important in identifying any at risk cladding systems in the longer term.
- Obtain design records, construction details, structural calculations, EWI system specifications, system certifications for the system, and appoint suitable expert advisors to assess the adequacy of the design and installation.
- On the basis of both of the above, establish what further non-invasive or invasive investigations are needed to confirm that the cladding is installed in a way which can safely resist likely wind-loading and dead loads.
- If necessary, commission remedial work to address inadequacies in the design or installation of the system. Also consider mitigating measures to protect people moving around the outside of the building until those works are complete.
- Consider what ongoing inspection regime is advisable.

16. The Scottish Government is working with the building safety Independent Expert Advisory Panel and the Standing Committee on Structural Safety (SCOSS) and in co-ordination with the devolved administrations to assess whether further guidance on the structural design, installation and maintenance of EWI systems is necessary.

### **Maintenance and alterations**

17. Building owners with rendered EWI systems also need to review procedures for making alterations or additions to walls where this involves fixing to or making holes in the surface. Maintenance manuals for EWI systems should provide further detail on specific considerations in relation to each type of system.

18. In general, wherever work is undertaken, care must be taken to ensure that fixings or penetrations (such as fixing of a satellite dish, hanging basket, washing line or penetrations for cables or pipes) are sealed with a durable finish and do not permit water to enter into the cladding system.

## **Annex B**

### **Visual inspection and condition survey of rendered External Wall Insulation Systems**

1. This annex provides initial advice on considerations in undertaking a visual condition survey of rendered (or brick slip) External Wall Insulation (EWI) systems. This guidance is not comprehensive, and you should consider seeking expert professional advice from a suitably qualified and experienced professional such as a Chartered Structural or Façade Engineer, or Chartered Building Surveyor.

#### **What is a visual condition survey? How is this done?**

2. A visual condition survey is a non-intrusive inspection of the key elements of the rendered EWI system to assess whether there is any deterioration which could lead to the system failing in some way.

3. As a first step you should obtain inspection and maintenance guidance information from the system manufacturer / installer for the specific system that has been fitted to your building. This will normally provide advice on how often visual inspections should be undertaken and key features to look for. If you already have regular inspections undertaken of the building, you should obtain the inspection records and review these.

4. The type and frequency of all inspections should be advised by the system manufacturer / approved installer. Typically, visual checks should be undertaken on at least an annual basis, encompass a full review of the exterior and a representative sample of key junctions and features. Increasingly, drones with high fidelity cameras, thermal imaging and other sensor packages are available to undertake this type of work. It is generally considered good practice for a full condition survey by a suitably qualified and experienced professional to be undertaken at least every ten years.

5. Due to the fact that a visual survey of the EWI system might not result in identification of potentially wet insulation behind or insufficiently fixed render meshes, an intrusive inspection should be considered. However, initial steps may include:

#### **General**

6. Access via a cherry picker, Mobile Extendable Working Platform (MEWP) or local portable scaffolding might be required to provide a safe work environment (consideration should be given to relevant requirements of the Construction Design and Management (CDM) regulations: [www.hse.gov.uk/construction/cdm/2015/index.htm](http://www.hse.gov.uk/construction/cdm/2015/index.htm) ).

#### **Inspection**

- a. Identify manufacturers (markings/signage/stickers etc.), consult building manuals, O&M documentation.
- b. Inspect externally for wet patches or potential discolouration of the render

- c. Inspect for any cracks or gaps at junctions in the render system, which could let rainwater pass, ideally investigate width and depth of the cracks via a crack width ruler
  - d. Consider using special infrared thermographic camera (mid to high resolution) equipment which could show insufficient insulation or wet insulation. The temperature difference between inside and outside would require ideally to be 20° Kelvin. Hence this assessment is generally best performed during winter months.
7. If it is necessary to undertake intrusive investigations you should seek professional advice on a case by case basis but this might include:
- e. Identify/select randomly approximately 10% of the facade cladding for intrusive survey via micro-invasive access, endoscopic equipment and sample extraction, which shall be sealed afterwards adequately.
  - f. Extract a core sample of the build-up (~50mm diameter and full depth of the EWI system); store in adequately sealed container; and submit for examination by specialist sub-contractor.

### **What is a visual condition survey looking to identify?**

8. EWI systems need to remain watertight in order to avoid water penetrating behind the render layer. This can cause failure in a number of ways including by making the insulation layer heavier; by weakening the bond between the render/brick slips layer and insulation (or insulation and substrate) or as a result of spalling caused by freezing action of rain water penetrating the surface.
9. There are also a number of other common indicators that the installation is failing or has problems which might for instance indicate inadequate fixings, excessive wear and tear caused by repeated exposure to wind loads, or differential movement in the underlying structure that has not been accounted for in the design of the system.
10. A visual inspection will typically be looking for common features such as:
- Cracking of render allowing water penetration or suggesting underlying movement.
  - Brick slips or render falling away from the insulation.
  - Cracking or deterioration of seals at junctions in the render system with adjacent materials such as windows, doors, service penetrations etc due to a number of reasons such as differential movement, and where deterioration could allow water to penetrate into the cladding system.
  - Damaged or incomplete waterproofing e.g. damaged or missing copings, cappings or seals that could allow water to penetrate into the cladding system.
  - Spalling – where small pieces of render are falling from the cladding.

- Blowing – bulges or distortions in the render layer indicating that it has pulled away from the underlying substrate, often confirmed by tapping giving a hollow sound compared to other non-blown render panels.
- Bubbling – groups of bubbles under the surface of the render layer which can be indicative of water penetration.
- Effervescence – effervescence often manifests as salt staining due to the migration of salts from the substrate into the render layer, and can be indicative of water penetration in the insulation / substrate.
- Mould – on the inside of external walls within dwellings

11. The above list is not exhaustive and you should seek further professional advice as necessary. All necessary health and safety precautions should be followed when undertaking a visual inspection, particularly when working at height. A full risk assessment will be necessary in accordance with the requirements of the latest CDM Regulations and current advice notes from the Health and Safety Executive.

### **What should I do if I identify problems / defects?**

12. You should contact the original system manufacturer for advice and assistance, and to obtain guidance on how to undertake any necessary repairs to the cladding system. You may also need to expert professional advice from a suitably qualified and experienced professional such as a Chartered Structural or Façade Engineer or Chartered Building Surveyor in order to be able to interpret the extent to which any defects or damage may give rise to a risk of any part of the system failing.

13. You may want to consider contacting the contractor and/or sub-contractor who carried out the original works and notify them of the suspected faults/defects, before any remedial works are carried out. You should consider taking independent legal advice prior to undertaking any remedial actions particularly in relation to your position with regard to latent defects and warranty provision.

14. If you are unable to contact the original contractor or sub-contractor, you may want to contact the Insulated Render and Cladding Association for further advice, at <https://www.inca-ltd.org.uk/>.

15. If you believe there is any imminent risk of elements of cladding falling from the building you should contact your Local Authority Building Standards Service which has a duty to advise on dangerous buildings. Residents inside the building are unlikely to be at any increased risk, but you should immediately consider what mitigation measures are necessary to protect people moving around the exterior of the building (including on balconies) such as controlling movement or access in the immediate vicinity below the area of cladding that is of concern.

16. You should then consider:

- What further non-intrusive or intrusive investigations are needed.
- Whether repairs or remedial works are necessary.
- What further advice is required on how to proceed.