

## **BS 85500: Flood Resilient Construction – Improving the Flood Performance of Buildings – Guidance**

### **PCA Response: recommendations and amendments to Committee CB/501**

The Property Care Association (PCA) is the UK's leading representative organisation for the protection of buildings. Championing high standards of professionalism, providing guidance, expertise, and advice for homeowners and professionals championing high standards of professionalism, providing guidance, expertise, and advice for homeowners and professionals.

Our skilled and audited membership operates across domestic, commercial and civil sectors in the structural repair, structural waterproofing, timber preservation, damp protection, flood remediation, residential dwelling ventilation and invasive weed control industries.

With strict membership criteria, comprehensive training programmes and a wealth of information for professionals and homeowners, the PCA and its members help protect the integrity and comfort of buildings in new build and refurbishment projects whilst also being a reliable source of guidance and expertise.

The following comments and or suggested amendments are made in relation to the consultation process by BSI for publication of this British Standard BS 85500 later in 2024.

Greyed out text is reflective of no comment. Proposed amendments to text or comments on the proposed text, are shown in standard black text.

#### **Recommendations**

Clarity in the introduction should be given as to **when** resilient protection from flood water is considered proper. It is noted that in the second paragraph that national and local planning policies discourage inappropriate development. This allows room for interpretation and differences in approach on identical buildings in identified flood risk areas.

There are current locations where the flood risk is considered low, but climate change is resulting in increased flood levels and therefore developments in these localities will require flood resilience. Added emphasis on the importance of future flood risk assessment based on environmental models should enable the guidance for resilient design and construction to be updated. This will ensure the longevity of the built environment and provide cost effective solutions. We recommend that this applies to new and retrofit resilient solutions.

The guidance provided in this standard does not consider the hazard assessment or the Property Survey and therefore the adhering to CIRIA C790B is still needed for clear understanding of the risks to property resistance and recovery, during and following a flood. This omission should be made known to the reader, as the effectiveness of the appraisal design option and material used for resilient construction is based on the expected hazard.

The rest of our responses set our proposed changes to the standard line-by-line. We have made suggested recommendations for changes to the overall standard which would better the document.

## 1. Scope

Added text should be considered to ensure that the document is not a replacement for the industry recognised CIRIA C790B: Code of Practice for Flood Resilience. But sets up a standard for understanding the hazards of flooding for producing cost effective resilience for building structures built or found in flood risk areas. An additional paragraph should be included as follows to reflect the supportive Code of Practice -

The guidance given for Flood Resilient Construction in this standard is focused on the **CIRIA CoP PFR stage 3: Options appraisal 4.2c** design considerations detailed and specification of materials based upon the quantified hazard assessment undertaken by others outside of this guidance.

In addition, we suggest therefore that the text at **1a)** should provide added clarity and read:

- a) design and construction material recommendations of a comprehensive flood hazard assessment and building survey for the adoption for flood resilience measures.*

## 2. Normative References

## 3. Terms and Conditions

The following are recommended revised textual changes to simplify the terminology used within the document.

### 3.1 avoidance:

#### 3.2 **flood hazard assessment:** *Alternative or added inclusive text:*

- determination of the flood hazard and risk potential from all likely sources and associated flooding parameters undertaken by a qualified individual.

#### 3.3 **flood recoverability:** *Alternative or added inclusive text:*

- specification of and material use and product details to limit the damage to the structural fabric from flood water allowing quicker recovery time and minimise remedial reinstatement costs.

#### 3.4 **flood resilience:** *Alternative or added inclusive text:*

- combined measure of flood water resistance of the building and the recoverability applied material that can be constructed onto the building fabric, including fixtures and fittings to mitigate the potential consequences of damage by flood water.

#### 3.5 **flood resistance:** *Alternative or added inclusive text:*

- preventing or minimising flood water entering the building limiting damage to the internal fabric.

#### 3.6 **qualified individual** *Alternative or added inclusive text:*

- surveyors holding a suitable qualification and having ability in the fields of geology, hydrology, hydrogeology and meteorology to determine flood parameters enabling delivery of the flood resilience process.

**3.7 Water entry strategy:** *Alternative or added inclusive text:*

- designed and acceptable allowances of water to enter the property.

**3.8 Water exclusion strategy:** *Alternative or added inclusive text:*

impermeable or low water penetration materials minimising ingress of water into the building.

## **4. Resilient Design Process**

### **4.1 Definition of resilience:**

### **4.2 CIRIA Code of Practice scheme delivery process:** *Additional or rephrased wording should include for:*

- BS 85500 is the reference standard to provide technical and material considerations for design and material options for improving flood resilience. It is supplementary to the framework of the CIRIA CoP and its purpose is to make fully assessed PFR solutions robust. The primary focus being **CIRIA CoP PFR stage 3: Options appraisal**.

The three design principles that underpin this standard are:

- hazard assessment confidence.
- proportionality of design resilience between the risk and costs
- provision of detailed information

### **4.3 Flood Characteristics and hazard assessments:** *Additional or rephrased paragraph wording should include for:*

Resistance and recoveries are based on the design strategies given in section 6 informed by the site-specific flood hazard assessment in accordance with BS 8533 *Assessing and managing Flood Risk in Development Code of Practice*.

### **4.4 Building surveys and design reviews for new builds:** *Additional or rephrased wording:*

an assessment of the current flood resilience measures is fundamental for a resilient design solution and therefore a highly structured assessment of the hazard or risk survey is necessary to consider all the factors including the expectations of the end user to support the PFR solution This will include on site construction verification of the design solution and the installation.

## **5. Impacts of Flooding on Buildings**

### **5.1 General:**

### **5.2 Flood Characteristics–**

#### **Table 1**

**Figure 1** - (This is a reproduced image and can be further improved and linked to the identified hazards in section).

### **5.3 Building Characteristics:**

#### **5.3.1 General:**

#### **5.3.2 Floors: Table 2**

#### **5.3.3 Walls: Table 3**

#### **5.3.4 Doors and Windows:**

#### **5.3.5 Fixtures and fittings:**

5.3.6 **Building Services:**

5.4 **Impact of flooding on building materials:**

5.4.1 **Insulation materials:**

5.4.1.1 **General:**

The general commentary within this sub clause is acceptable however the introductory title text is verbose and has been simplified for the following sub-clauses.

5.4.1.2 **Insulation type:** *Amended and simplified sub clause introductory title-dropping*  
*Different types of insulation: reflective or bulk.*

5.4.1.3 **Insulation characteristics:** *Amended sub clause introductory title dropping*  
*Relevant Impacts of flooding on the useful characteristics of insulation materials:-*

5.4.1.4 **Flood Exposure:** *Amended sub clause introductory title dropping*  
*Impacts of insulation materials that have been exposed to flooding on the building:-*

5.4.1.5 **Resilient insulation products** *Amended sub clause introductory title dropping*  
*Identifying Insulation products with appropriate characteristics to support resilient construction:-*

5.4.1.5.1 **General**

5.4.1.5.2 **Water absorption:**

5.4.1.5.3 **Water vapour transmission:**

5.4.1.5.4 **Classification of insulation:**

5.4.2 **Concrete Products**

5.4.2.1 **General:** Structure and weather resistance

5.4.2.2 **Concrete and Concrete products:** *Amended sub clause introductory title dropping*  
*Types of Concrete and concrete products:-*

5.4.2.2.1 **In situ cast concrete:** New sub clause.

5.4.2.2.2 **Precast Concrete:** New sub clause.

5.4.2.2.3 **Screeds:** New sub clause.

5.4.2.2.4 **Cementitious Materials:** New sub clause.

5.4.2.2.5 **Insulated concrete formwork:** (ICF) is not a concrete product. It is a recognised modern method of construction system build. Its behaviour to flood water will be completely different to a concrete based product requiring a separate sub heading within this section.

5.4.2.3 **Concrete characteristics:-** *Amended sub clause introductory title dropping*  
*Relevant impacts of flood on the useful characteristics of concrete materials:-*

5.4.2.4 **Flood exposure:** *Impacts of concrete materials that have been exposed to flooding on the building:-*

5.4.3 **Screeds:** It is considered that screeds and other cementitious products should be included under the sub paragraph of 5.4.2 Concrete products. Flood water will impact directly and residually on materials and installed product systems. The most likely impact from flooding will result in separation from the base slab. Screed porosity of the product will also result in water trapped in the voids and identification of this should be included as an impact from flood water.

5.4.4 **Masonry and mortar:** ~~Masonry materials (including mortar)~~

5.4.4.1 **General:**

5.4.4.2 **Types of masonry** ~~Amended sub clause introductory title dropping and mortar:~~

5.4.4.3 **Masonry characteristics:** ~~Amended sub clause introductory title dropping~~

~~Relevant impacts of flood on the useful characteristics of masonry materials:~~

~~Dimensionally; Hydrostatic; surface and structural damage; Contamination and staining.~~

5.4.4.4 **Flood exposure** ~~Amended sub clause introductory title dropping Impacts of concrete materials that have been exposed to flooding on the building:~~

5.4.5 **Timber materials:**

5.4.5.1 **General:**

5.4.5.2 **Timber characteristics:** ~~Amended sub clause introductory title dropping Relevant impacts of flood on the useful characteristics of timber materials:~~

5.4.6 **Gypsum and plaster products:** ~~Amended sub clause introductory title dropping Plaster and plasterboard.~~

5.4.6.1 **General:**

5.4.6.2 **Gypsum products:** ~~Amended sub clause introductory title dropping Different types of gypsum plasterboard/plaster.~~

5.4.6.3 **Gypsum Characteristics:** ~~Amended sub clause introductory title dropping~~

~~Relevant impacts of flood on the useful characteristics of gypsum plasterboard/plaster.~~

5.4.6.4 **Flood Resilience characteristics:** ~~Amended sub clause introductory title dropping Relevant characteristics to the flood resilience of gypsum plasterboard/plaster:~~

5.4.7 **Modern methods of Construction**

**6. Design Strategies**

6.1 **General:**

6.2 **Opportunities for incorporating flood resilience.**

6.3 **Planning Policy and statutory requirements:**

6.4 **Other factors**

6.5 **Site layout and wider environmental factors:**

6.6 **Factors for including resistance:** *Additional or rephrased wording:* Surface drainage is to be considered within the sub-clause; however, the text should be extended by also considering the impact of SUDS across the development area, which may have a negative or positive impact on a resilient design. Surface water management across the site and adjacent topography will need to be included for supporting the requirements of an effective resilient design.

6.7 **Factors for including recoverability:**

**7. New Build**

7.1 **Detailed design:**

7.1.1 **New Build Construction**

7.1.2 **Detail Design Strategies:**

**7.1.3 Detailed Design Guidance: Figure 2 – Additional Notation:** Suggest that water symbol needs to be annotated with “predicted floor level”

**Figure 3 –**

*Additional Notation:* Water symbol needs to be annotated with “predicted floor level”

**Figure 4 –**

*Additional Notation:* Add note to the drawing for suggested height of concrete wall above the predicted flood level.

Water symbol needs to be annotated with “predicted floor level”.

Cavity tray (11) not shown. Should be included on drawing.

Wall insulation (4) should be annotated as flood resilient insulation to provide clarity.

**Figure 5 –**

*Additional Notation:* Add note for suggested height of concrete wall above the predicted flood level.

Water symbol needs to be annotated with “predicted floor level”.

**Figure 6 –**

**Hazard Table**

**Figure 7**

*Additional Notation* Insulation (4) should be noted as partial fill cavity wall and be resilient. This type of insulation is prone to displacement in a flood and is therefore ineffective thermally.

Cavity trays are not located on the example diagram.

**Hazard -**

**Hazard A** – an additional note to the drawing stating that partial fill cavity wall insulation is subject to displacement reducing the effectiveness of performance.

**Figure 8**

*Additional Notation* Water symbol needs to be annotated with “predicted floor level”.

**Hazard -**

**7.2 Detailed design considerations for new build elements affected by flooding:**

**7.2.1 Foundations and substructure:**

**7.2.2 Basements**

**7.2.3 Ground Floors**

**7.2.3.1 General:**

**7.2.3.2 Ground-supported floors –**

**7.2.3.3 Suspended floors**

**7.2.3.4 Damp proof membranes:**

**7.2.3.5 Floor Insulation:**

**7.2.3.6 Floor finishes and skirtings**

**7.2.3.7 Ground floor sump:**

**7.2.4 External walls (building enclosure)**

**7.2.4.1 General**

**7.2.4.2 Concrete walls.**

**7.2.4.3 Masonry walls**

**7.2.4.4 Insulated cavity wall construction:**

**7.2.4.5 Externally insulated wall construction**

- 7.2.4.6 Structural framed walls –
- 7.2.4.7 External coatings and linings

#### 7.2.5 Internal walls and stairs

- 7.2.5.1 Stairs:
- 7.2.5.2 Separating walls:
- 7.2.5.3 Internal partition walls:
- 7.2.5.4 Internal linings:
- 7.2.5.5 Internal render systems:

### 8. Retrofit

**8.1 Retrofit construction details:** There is a need for the annotation to be improved and provide clarity and consistency of material symbols to the three sketch figures. This could potentially involve a redrawing of the figures by the committee.

**Figure 9a** - Retrofit measures to improve flood resilience of existing property with solid masonry walls and suspended timber floor.

- *Emphasise the text at the bottom of the figure as this is the emphasis of the drawing* - Existing building with hazards.

**Figure 9b** - Retrofit measures to improve flood resilience of existing property with solid masonry walls and suspended timber floor –

- *Emphasise the text at the bottom of the figure as this is the emphasis of the drawing* - Mitigation measures including potential thermal upgrades.

**Figure 9c** - Retrofit measures to improve flood resilience of existing property with solid masonry walls and suspended timber floor.

- *Emphasise the text at the bottom of the figure as this is the emphasis of the drawing* - Alternative mitigation measures including potential thermal upgrades: internal drained cavity/replacing internal floor.

Hazards:

**Figure 10a** – Retrofit measures to improve flood resilience of existing non insulated cavity wall construction.

- *Emphasise the text at the bottom of the figure* - Existing wall/floor section of building with major flood hazards.

**Figure 10b** - Retrofit measures to improve flood resilience of existing non insulated cavity wall construction.

- *Emphasise the text at the bottom of the figure.* Mitigation measures including potential thermal upgrades.

Hazards:

#### 8.2 Detailed design guidance

- 8.2.1 General:
- 8.2.2 Foundations:
- 8.2.3 Basements and cellars:
- 8.2.4 Floors:
- 8.2.5 External walls:
- 8.2.6 Party walls:
- 8.2.7 Internal walls:
- 8.2.8 Internal stairs

## 9. Doors, windows and air vents

### 9.1 General:

### 9.2 External doors -

9.2.1 **External Doors: ~~General:~~** *Change sub heading text from General to external doors*  
Include associated details for temporary barriers up to and above the predicted flood levels.

9.2.2 Windows and glazed doors:

9.2.3 Air vents:

### 9.3 Internal doors:

## 10. Fixtures and fittings:

## 11. Services

11.1 General:

11.2 Pipework:

11.3 Drainage Services:

11.4 Electrical services:

11.5 Heating Systems

11.6 Communication Wirings:

## 12. Other Issues

12.1 Workmanship:

12.2 Sustainability:

## Bibliography

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For further information on our response, please contact:

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