



Assessment of proposed robustness measures following the ‘Alternative approach’ given in Approved Document A Section 5 paragraph 5.4

Purpose

BCA technical guidance notes are for the benefit of its members and the construction industry, to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature, and in all cases the responsibility for determining compliance with the Building Regulations remains with the building control body concerned.

This guidance note is based upon information available at the time of issue and may be subject to change. The Approved Documents should be consulted for full details in any particular case.

Introduction

This document relates to BCA’s assessment of proposed performance class and robust measures to meet disproportionate collapse guidance according to the Alternative approach given in The Building Regulations 2010 Approved Document A 2004 edition incorporating 2004, 2010 and 2013 amendments. This note was originally written by NHBC and has been adopted by BCA as best practice.

Key Issues

Approved Document A Section 5 provides statutory guidance in support of Requirement A3 of The Building Regulations for disproportionate collapse. As an alternative approach, performance may be demonstrated using the recommendations given in the supporting guidance referred to in clause 5.4 of Approved Document A.

Statutory Supporting Guidance (paragraphs 5.1—5.3 inc)

Approved Document A Section 5 provides statutory guidance in support of Requirement A3 of The Building Regulations for disproportionate collapse. The provisions are determined according to the Consequence Class (CC) of the building and for classes CC1 & CC2 are restricted to strategies based on limiting the extent of structural failure following an accidental event due to **abnormal** hazards on the building structure.

The strategies are:

- Prescriptive rules (e.g. integrity and ductility) CC1 & CC2a
- Enhanced redundancy (e.g. effective horizontal and vertical tying, alternative load paths, etc); CC2b
- Key element design to sustain notional accidental actions; CC2b

For Consequence Class 3 buildings, a systematic risk assessment of the building should be undertaken to identify the critical situations with the detailed design then being in accordance with the recommendations given in the Standards identified in paragraph 5.2 of Approved Document A. Class 3 structures would be expected to have at least Class 2b measures in addition to any further measures required as a result of the risk assessment.

For BCA’s interpretation of the disproportionate collapse Requirement A3 refer to BCA Guidance Note 21 – England and Wales (2014) - Disproportionate Collapse

Alternative Approach (paragraph 5.4)

As an alternative approach to the above, performance may be demonstrated using the recommendations given in the supporting guidance referred to in clause 5.4 of Approved Document A, for buildings:

- a. that do not fall into the classes listed in *Approved Document A Table 11 – Building Consequence Classes*, or
- b. for which the consequence of collapse may warrant particular examination of the particular risks involved.

These documents provide additional guidance on undertaking building risk assessment for classification purposes and structural robustness.

Following the guidance given in the publications identified in clause 5.4 might be one acceptable way of demonstrating performance in such instances.

Building Control Bodies will generally require buildings to comply with Approved Document A supporting guidance or with the Standards referenced in paragraph 5.2, but where a building is designed according to the 'alternative approach' option, BCA's view on assessment for Building Control (and Warranty purposes) will include thorough consideration of the proposed design philosophy and robustness measures. It will require suitable demonstration that the following aspects have all been adequately addressed:

- The design complies with appropriate Eurocodes, relevant UK National Annexes and Published Documents, and other authoritative guidance identified in Approved Document A clause 5.4. Withdrawn British Standards might also be acceptable. (ref. DCLG Circular Letter - 30 July 2013)
- The overall structure, including all floor levels, is no less robust than it would have been had it been designed to be compliant with Approved Document A Table 11.

With the exception of the particular situations illustrated in BCA Guidance Note 21 (e.g. paragraph 2.4 Example 6, paragraph 2.5 Example 9, etc) Building Control Bodies will generally require any building to be designed to the same consequence class for its full height. However, where an alternative approach is proposed for a building that incorporates a 'strong floor' (ref: *'Practical Guide to Structural Robustness and Disproportionate Collapse in Buildings'* dated October 2010 published by The Institution of Structural Engineers, London.) and the robustness measures proposed for the storeys above the 'strong floor' are designed to a lower consequence class than those below, the 'strong floor' itself will need to be designed to act as a 'crash deck' to support collapse or partial collapse from the building structure above.

Building Control (and Warranty) assessments of buildings that incorporate 'strong floor' design philosophy will require the previous two points to be addressed and in addition:

- It would need to be demonstrated that the strong floor and supporting structure provides at least as robust a platform for the storeys above, as that provided by the building foundations. (NB - Supporting storeys subject to sway are unlikely to fulfil this requirement.)
- The strong floor would need to be designed for impact force (dynamic effect of loading) imposed by the collapse debris, unless a reason based on engineering principles acceptable to the Building Control Body is provided for not considering the impact force.
- With respect to the previous point, the design of a strong floor and its supporting structure should not be based on notional accidental actions' as defined in BS EN 1991-1-7:2006 Section 3; the action should be treated as **identifiable and quantifiable**, i.e. collapse debris from the upper storeys. In this respect, all relevant actions and combinations of actions should be clearly defined in accordance with relevant codes, UK National Annexes, Published Documents, etc. (NOTE – BS EN 1991-1-7:2006 does not consider identified quantifiable accidental actions of collapse debris)
- Worst case design scenarios would need to be clearly defined (e.g. full collapse of the upper storeys, partial collapse of the upper storeys, collapse debris uniformly distributed over the support floor area or unevenly distributed over some part of the supporting floor area).
- It would need to be demonstrated that the support floor as well as the structure below the support floor are capable of resisting the worst case design actions and combination of actions.
- It would need to be demonstrated that the hazard posed by collapse debris from upper levels to surrounding areas/members of the public would not be greater than that expected of structures complying with the limits given in Approved Document A Table 11.
- It would need to be demonstrated that recommendations for safe evacuation of persons from the premises and its surroundings had been considered. See BS EN 1991-1-7:2006 clause 3.2(2) Note 1 with its UK National Annex.