

## **BUILDING ACT 1984 - SECTION 50(2)**

### **DETERMINATION OF COMPLIANCE WITH REQUIREMENT B4 ("EXTERNAL FIRE SPREAD") IN PART B ("FIRE SAFETY") OF SCHEDULE 1 TO THE BUILDING REGULATIONS 2000 (AS AMENDED) IN RESPECT OF THE GLAZING IN THE WINDOWS IN THE REAR WALL OF A NEW OFFICE BUILDING**

#### **The proposed work and question arising**

4. The papers submitted indicate that the proposed building work in this case comprises the erection of a new office building consisting of basement, ground and floor levels 1–4 (six storeys in total), with a plan area of approximately 710m<sup>2</sup>. The new offices are to be constructed on a new concrete raft laid on top of the pre-existing basement raft and floor slab. The building is to have a concrete frame with an external cladding of brick and glass. Each floor is to be constructed as a compartment floor. An AI was appointed to provide the building control service for the proposed work on 9 September 2005.

5. The rear wall of the proposed building is 215mm from the site boundary. The wall on this elevation will incorporate several large windows. Given the proximity of the boundary you have proposed the use of fire-resisting glazing in these windows. However, rather than specifying glazing with fire resistance in terms of both integrity and insulation you propose to use glazing which has 60 minutes integrity but has no insulation value. You have submitted a copy of a Study report from your fire engineer to support your argument that insulation would not be necessary.

6. The AI took the view that the fire engineer's report did not adequately demonstrate compliance with Requirement B4 ("External fire spread") of the Building Regulations and rejected your proposals in relation to the glazing in the rear wall of the proposed building. It is in respect of this question that you have applied to the Secretary of State for a determination.

#### **The applicant's case**

7. You consider that the relative cost of your proposals is of no consequence and that you have demonstrated compliance with Requirement B4 using a fire-engineered approach. This is an alternative method to the guidance in Approved Document B ("Fire safety" – 2000 version, as amended), but you believe that the regulations and the guidance permit this. This can be summarised as:

- (i) The recognised criteria for assessing the potential for fire spread via radiation is set out in BRE report BR187 "External fire spread: building separation and boundary distances". This ensures that the radiant heat flux on a building adjacent to a burning building does not exceed 12.55 kW/m<sup>2</sup>.
- (ii) The computer modelling carried out by the fire engineer shows that, in the event of a fire in the proposed building, this value would not exceed 3.65 kW/m<sup>2</sup>.

8. The fire engineer's modelling is based on the assumption that standard 6mm double glazing would retain its integrity in the event of a fire provided the temperature of the glazing remains below 600°C. The modelling results show that the use of a fire-resisting glazing system would not be necessary. However, as an added safety factor, you propose to install glazing with fire resistance in terms of integrity only.

### **The AI's case**

9. The AI's case can be summarised as follows:

- (i) He considers that the glazing of the windows in the rear wall of the proposed building should provide fire resistance to achieve 60 minutes integrity and 60 minutes insulation from both sides as specified in Approved Document B, due to the close proximity of the rear wall to the site boundary (i.e. 215mm).
- (ii) The use of the criteria set out in the BRE report BR187 is only appropriate in the circumstances set out in paragraph 14.15 of Approved Document B, which is when the wall is at least 1000mm from the boundary.
- (iii) The adjoining site owner would have the right to build a building with openings facing the proposed building within 1000mm of the boundary. Failure to provide appropriate levels of both integrity and insulation would create a "dangerous precedent" and could lead to uncontrolled spread of fire from one building to another.

### **The Secretary of State's consideration**

10. In the Secretary of State's view, to comply with Requirement B4 of the Building Regulations, the external walls of the proposed building should be constructed so that the risk of ignition from an external source and the spread of fire over their surfaces is restricted, and the amount of unprotected area in the side of the building should be restricted so as to limit the risk of a fire spreading from the building to a building beyond the site boundary or vice versa.

11. The AI has argued that the proximity of the boundary to the rear wall in question is such that the glazing should have fire resistance in terms of both integrity and insulation. But you have presented computer modelling results from your fire engineer that appear to demonstrate that the radiant heat flux at the boundary of the site, in the event of a fire in the proposed building, would be less than that needed to cause a fire on an adjacent building and as such you do not propose to provide fire resistance with insulation value.

12. The Secretary of State recognises that following the guidance set out in Approved Document B is only one way of showing compliance with the functional requirements of Part B ("Fire Safety"). However, it is important that an alternative approach is robust and justifiable. The Secretary of State takes the view that there are three principal mechanisms associated with fire spread between buildings: direct flame contact; thermal radiation; and, in the case of roofs, burning brands. Each of these mechanisms should be considered when assessing the risk of fire spread from one building to another.

13. Where a wall is constructed within 1000mm of the site boundary, there is a potential that flames from a fire in an adjacent building could come into contact with the wall. It for this reason that the fire resistance of walls within 1000mm of a boundary should normally be specified in terms of both integrity and insulation and from both sides. The insulation component of the fire resistance is intended to limit the temperature rise of an element, in this case the windows, so that combustible materials adjacent to the side not directly exposed to the fire will not ignite.

14. You have argued that a fire within the proposed building will not result in unacceptable thermal radiation levels at the boundary. However, you have not addressed the risk of fire spreading to the proposed building from fire in an adjacent building from direct flame contact. As such the Secretary of State considers that your proposals do not show compliance with Requirement B4.

15. Notwithstanding the key issues addressed above, the Secretary of State also comments that:

- (i) As the AI has stated, Approved Document B makes it clear that the method set out in the BRE report BR187 is only applicable where the boundary distance is at least 1000mm; below that distance the guidance accompanying Diagram 44 is appropriate. This is because the method does not assess the risk of direct flame contact which becomes important for boundary distances of less than 1000mm.
- (ii) The assumption by your fire engineer that a non-fire rated glazing system will maintain integrity up to a temperature of 600°C is highly dubious as it is based on the results of a single experiment. Assumptions about the behaviour of a generic material should be on the basis of application-specific tests or an historical record / understanding of that material's likely behaviour in the intended application.
- (iii) In addition, the computer model used would not appear to calculate the transmission of radiation through glazing. As an important physical mechanism is not included in the simulation additional consideration could be necessary to fully assess the risk of fire spread.

### **The determination**

16. As indicated above, in coming to her decision, the Secretary of State has given careful consideration to the particular circumstances of this case and the arguments presented by both parties.

17. The Secretary of State considers that your proposals, as submitted, do not make adequate provision to resist the spread of fire from or to the rear wall of the proposed building. She has therefore concluded and hereby determines that the plans of your proposed building work do not comply with Requirement B4 ("External Fire Spread") in Part B ("Fire Safety") of Schedule 1 to the Building Regulations 2000 (as amended).