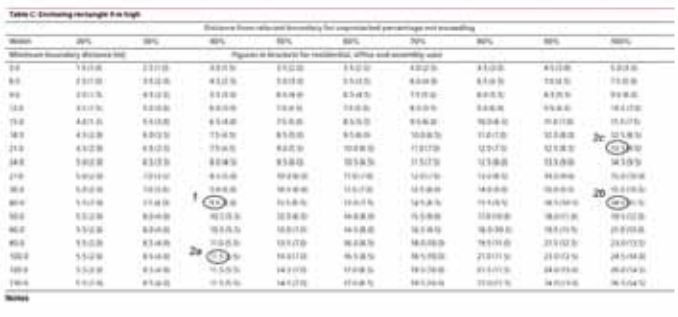

Figure 9: BRE 187 Table C, example values

## Clause 2.2 of P313

The query that prompted the writing of this article concerns the application of Clause 2.2 of SCI Publication 313. Clause 2.2 states:

"These recommendations apply to columns supporting protected areas of external walls. Columns supporting protected areas will require fire protection up to eaves level, regardless of the extent of the protected area. Therefore, when less than 100% of the wall is required to have fire resistance it is preferable to arrange the protected area so that it covers as few columns as possible thereby minimising the requirements for fire protection and moment resisting bases."

Read in isolation, this advice encourages the designer to consolidate the protected area into as few bays as possible, and, by extension, concentrate the unprotected area over the rest of the building side. But as the preceding example demonstrates, it is unlikely to be possible to arrange the unprotected areas in such a concentrated manner and still satisfy an assessment to BRE 187.

Where the relevant boundary is skewed relative to the building, it would perhaps be possible, but the structural engineer would need to demonstrate that unprotected structural elements would not compromise the stability of the protected elements. In practice, this means demonstrating that the collapse of unprotected columns and rafters in the fire-affected zone would not pull down the protected columns and the wall they support. In the past, a designer may not have felt it necessary to provide formal justification for this; but in the post-Grenfell regulatory atmosphere, that is unlikely to remain the case, where designers are increasingly expected to demonstrate the robustness of their fire design through analysis rather than precedent alone.

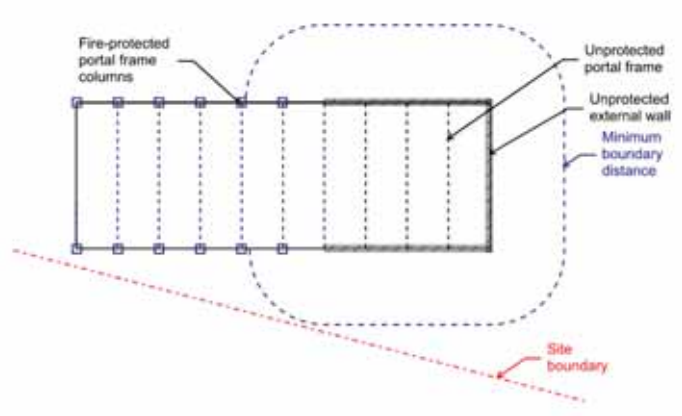


Figure 10: Plan of building with skewed boundary

## Conclusions

The simplified table in Approved Document B Table 13.1 is a useful tool for small buildings, but it should not be applied uncritically to large uncompartmentalised buildings. For large building, BRE 187 should be used to verify that the proposed arrangement of unprotected areas is acceptable.

The intent of the guidance in P313 to minimise the number of columns requiring fire protection by concentrating the protected area is understandable, but designers should recognise that the resulting concentration of unprotected area may require a greater boundary distance than Table 13.1 from Approved Document B would suggest. ■

# AD 557: Robustness and fire

SCI's Advisory Desk has become aware of some requests to apply the "robustness" rules found in BS 5950 and BS EN 1991 in the fire limit state. This AD clarifies the requirements.

The requirement to verify a structure in the fire limit state is entirely separate to the avoidance of disproportionate collapse (the "robustness" rules).

Fire design (e.g. provision of fire protection) is intended to ensure that elements of structure do not lose their ability to support design loads for the duration of the specified fire period. The possibility of fire is a "known" accidental situation and must be designed for, as required under the "Basic requirements" of BS EN 1990 clause 2.1(3).

Robustness rules are there to ensure the structure does not suffer disproportionate collapse if an accidental action causes an element of structure to lose its ability to support design loads. BS EN 1990 clause 2.1(4) covers the necessity to avoid disproportionate collapse. In contrast to the specified actions in the fire limit state, the actions potentially leading to disproportionate collapse are unidentified.

To apply the robustness rules in the fire limit state is the equivalent of assuming that during one accidental situation (fire) there is a second, unidentified accidental event. Two accidental situations are not assumed to be concurrent.

However, while this approach is appropriate for typical buildings, there may be cases, possibly for higher-risk buildings, where collaboration between the structural engineer, fire engineer and other relevant parties is necessary to determine whether the risk of disproportionate collapse in fire warrants further assessment.

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