# Roundhouse- Campus Building

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| **Project** | **Roundhouse Campus Building** |
| **Subject** | **Fire Strategy** |
| **Topic** | **External Walls** |
| **Date** | **9th June 2021** |
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| **Reviewer** | **Matthew Ryan – Associate Director** |
| **Project no.** | **P372** |

THE FIRE SURGERY

## 1 Introduction

The Fire Surgery Ltd has been appointed by The Roundhouse Trust Ltd to develop a fire strategy for the Roundhouse Campus Building to be located on the existing Roundhouse campus site in Chalk Farm, London. The building provides three new, flexible use studios primarily to be used by young persons (aged 11 – 25), a co-working space and breakout space. The building has two storeys above ground floor, with the topmost storey containing only building services plant and toilets. The height of the building measured from the ground floor access level to the finished floor level of the second floor is ca. 5.5m.

A RIBA Stage 4 Fire Strategy report has been produced by the Fire Surgery Ltd on 19th February 2021 (*210219R0F1 - P372 Building 3 Roundhouse - Stage 4 Fire Strategy Report*). The fire strategy was developed with the intention to show that the current scheme design can satisfy the functional requirements of Part B the Building Regulations 2010. BS9999: 2017 fire safety design guidance has primarily been applied to achieve this, with fire engineering being used where appropriate to provide an alternative but equivalently safe design solution. Assent Building Control have provided no adverse comments on the fire strategy. No additional provisions for property protection have been considered and have not been requested by the client.

It is understood that during the planning process the London Borough of Camden Planning department has raised concerns about the proposed use of timber on the external walls of the building. This Design Note document has therefore been produced to provide a summary of the performance of the external walls with respect to meeting the relevant Part B Building Regulations 2010 requirements.

As indicated on the proposed plans and elevations, the design incorporates timber rainscreen cladding at ground and first floor level - primarily along the site boundary facing Chalk Farm Road but also in more limited areas on the south, west and east sides within the Roundhouse site boundary. The timber is to be an untreated, reclaimed hardwood (Australian Jarrah) in 25mm thick planks with aluminium copings.

This Design Note document has been produced with specific reference to the proposed Roundhouse Campus Building. It should not be used in full or in part to support any other scheme. Changes to the proposed scheme may invalidate the content of this Design Note, therefore this document will need to be reviewed should any changes be proposed.

## 2 Requirement B4 of the Building Regulations: External Fire Spread

Part B of the Building Regulations 2010 require the external walls of a building to adequately resist the spread of fire over the walls and from one building to another. Requirement B4 of Part B of the Building Regulations including Regulation 7, as taken from Approved Document B, is provided in Figure 1. The building falls under the 'Assembly and Recreation purpose group and is less than 18m in height and is therefore not classified as a 'relevant building' under Regulation 7.

**Requirement**

| *Requirement* | *Limits on application* |
|---|---|
| **External fire spread** | |
| **B4.** (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building. | |
| (2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building. | |

**Regulation**

**Regulation 7 – Materials and workmanship**

(1) Building work shall be carried out—

(a) with adequate and proper materials which—

(i) are appropriate for the circumstances in which they are used,

(ii) are adequately mixed or prepared, and

(iii) are applied, used or fixed so as adequately to perform the functions for which they are designed; and

(b) in a workmanlike manner.

(2) Subject to paragraph (3), building work shall be carried out so that materials which become part of an external wall, or specified attachment, of a relevant building are of European Classification A2-s1, d0 or Class A1, classified in accordance with BS EN 13501-1:2007+A1:2009 entitled "Fire classification of construction products and building elements. Classification using test data from reaction to fire tests" (ISBN 978 0 580 59861 6) published by the British Standards Institution on 30th March 2007 and amended in November 2009.

*Figure 1 - Requirement B4 and Regulation 7*

### 2.1 External fire spread assessment

External fire spread calculations have been carried out using the guidance in BR 187 *External fire spread Building separation and boundary distance*, as directed by BS 9999:2017. This is carried to demonstrate that the external envelope of the building does not act as a medium for undue fire spread to adjacent buildings or be readily ignited by fires in adjacent buildings.

The Campus building is to be provided with fire compartment floors and all services risers going into the plant spaces are to be fire stopped to 60 minutes fire resistance. Therefore, it would be unlikely that a fire would spread the full height of the building (it is reasonable to assume that an outbreak of fire would be contained within the fire compartment of origin for at least the 60 minutes period of fire resistance).

Full details of the external fire spread assessment are provided in section 6.1.2 and Appendix D of the RIBA Stage 4 Fire Strategy Report. This assessment shows that all elevations, except the portion of the façade facing the container building (which requires protection as a minimum 60 minutes fire resisting portion), do not require to be fire resisting to meet the relevant expectations under Part B of the Building Regulations 2010 for space separation/ boundary condition purposes.

As the external stair, which is less than a 1m to the boundary between the Container Building is enclosed in a screen the fire resistance for the external walls will be as shown in Figure 2 instead of allowing for 100% fire resistance from both sides to the screen enclosing the external stair. A small plant space is located next to the external escape stair. However, this only contains a water booster set and a water storage tank, therefore it is proposed that the external wall on the front face of this plant is not fire rated.

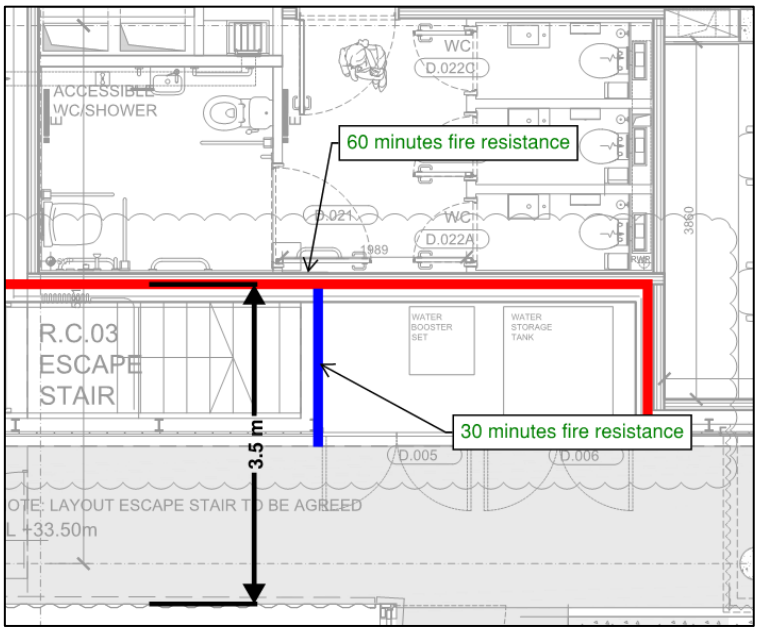


*Figure 2 - Fire resistance to external walls facing the Container building*

## 2.2 External surfaces of walls

External walls should be constructed such that they will not support fire spread at a speed that is likely to threaten people in or around the building. Flame spread over or within an external wall construction should be controlled to avoid creating a route for rapid fire spread bypassing compartment floors or walls. External wall surfaces near other buildings should not be readily ignitable, to avoid fire spread between buildings.

Approved Document B (ADB) 2019 has been used to provide recommendations for the external walls as it provides the most up to date guidance on the fire performance expectations of external walls. ADB explicitly states that each surface is permitted to be assessed individually.

Whilst it is not usually best practice to mix benchmark guidance documents when developing a fire strategy, the clarified ADB 2019 guidance for the assessment of external wall surface spread of flame performance has been applied to the Roundhouse scheme as it will provide a more refined approach and will ultimately apply the most up-to-date guidance in this specific area of design. Based on this guidance, the guidance in Table 12.1 of ADB (Figure 3) applies to this building. This recommends that the entire building external wall surface up to 10m in height from ground floor should achieve a reaction to fire performance classification of C-s3,d2 or better, with the exception of the entire external wall surface facing the container building, which should have a reaction to fire performance classification of B-s3,d2 or better. The elevation facing the rest of the Yard on the South of the building can achieve reaction to fire performance classification of C-s3,d2 or better. Note, under ADB guidance the 'external surface' is considered to be the 'outermost external material'.

**Table 12.1 Reaction to fire performance of external surface of walls**

| Building type | Building height | Less than 1000mm from the relevant boundary | 1000mm or more from the relevant boundary |
|---|---|---|---|
| 'Relevant buildings' as defined in regulation 7(4) (see paragraph 12.11) | | Class A2-s1, d0[1] or better | Class A2-s1, d0[1] or better |
| Assembly and recreation | More than 18m | Class B-s3, d2[2] or better | From ground level to 18m: class C-s3, d2[3] or better<br>From 18m in height and above: class B-s3, d2[2] or better |
| | 18m or less | Class B-s3, d2[2] or better | Up to 10m above ground level: class C-s3, d2[3] or better<br>Up to 10m above a roof or any part of the building to which the public have access: class C-s3, d2[3] or better[4]<br>From 10m in height and above: no minimum performance |
| Any other building | More than 18m | Class B-s3, d2[2] or better | From ground level to 18m: class C-s3, d2[3] or better<br>From 18m in height and above: class B-s3, d2[2] or better |
| | 18m or less | Class B-s3, d2[2] or better | No provisions |

**NOTES:**

In addition to the requirements within this table, buildings with a top occupied storey above 18m should also meet the provisions of paragraph 12.6.

In all cases, the advice in paragraph 12.4 should be followed.

1. The restrictions for these buildings apply to all the materials used in the external wall and specified attachments (see paragraphs 12.10 to 12.13 for further guidance).
2. Profiled or flat steel sheet at least 0.5 mm thick with an organic coating of no more than 0.2mm thickness is also acceptable.
3. Timber cladding at least 9mm thick is also acceptable.
4. 10m is measured from the top surface of the roof.

*Figure 3 - Reaction to fire performance of external surface of walls (Taken from Approved Document B: 2019)*

The reaction to fire performance requirements for the external wall surfaces for the Campus building are shown in Figure 4, Figure 5 and Figure 6.

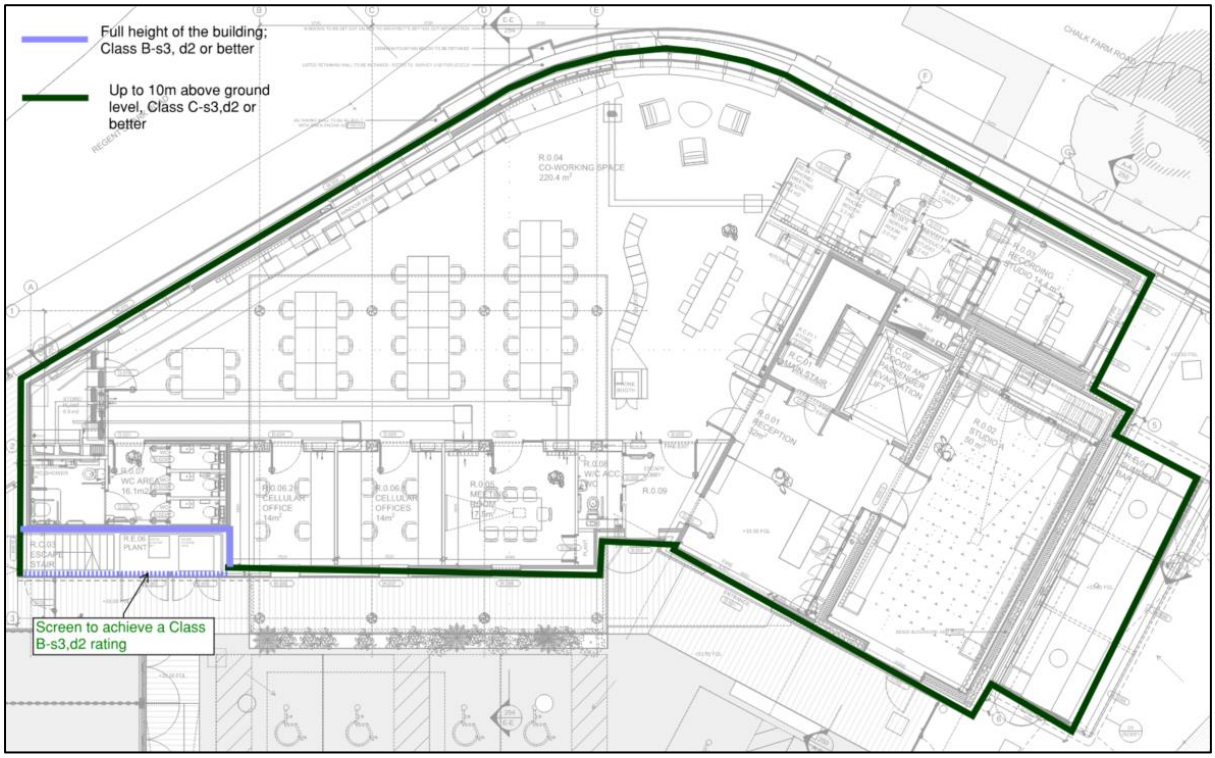


*Figure 4 - External wall surfaces- reaction to fire performance requirements (Ground floor)*

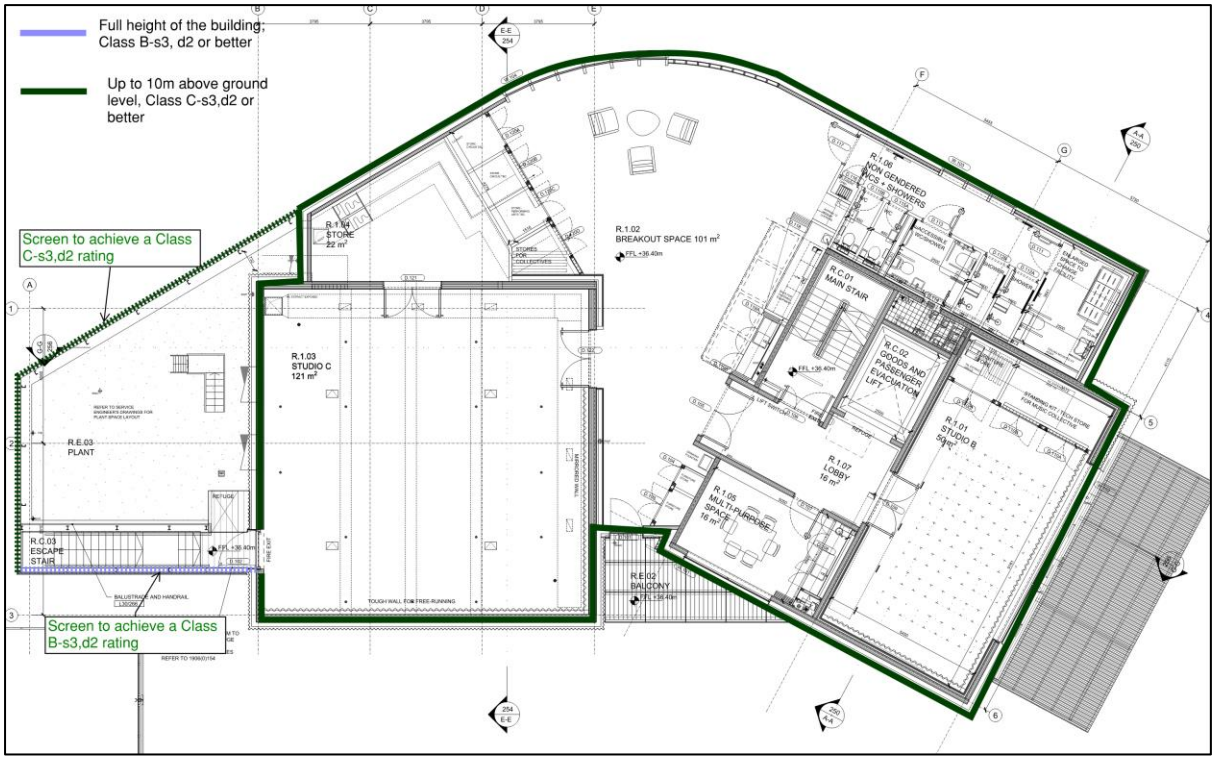


*Figure 5 - External wall surfaces- reaction to fire performance requirements (First floor)*


*Figure 6 - External wall surfaces- reaction to fire performance requirements (Second floor)*

As noted in Footnote 3 of Figure 3, timber cladding that is more than 9mm thick is considered to be acceptable where a reaction to fire performance specification of C-s3,d2 is called for. Where the external timber walls do not meet this thickness, the external walls will need to be treated with an appropriate fire retardant to achieve the required C-s3,d2 or better rating. The untreated timber sleepers that are proposed to be used as a rainscreen system are 25mm thick, and thus are of a thickness considered to be acceptable under the aforementioned Footnote 3 where the C-s3,d2 or better rating is permitted.

The external wall facing the Container building will be treated with an appropriate fire retardant to achieve the required B-s3,d2 or better rating.

### 2.3 Concealed spaces and cavities

Concealed spaces or cavities in construction will be provided with cavity barriers or fire stops in accordance with Figure 7. This includes the provision of appropriate cavity barriers to the external wall construction.

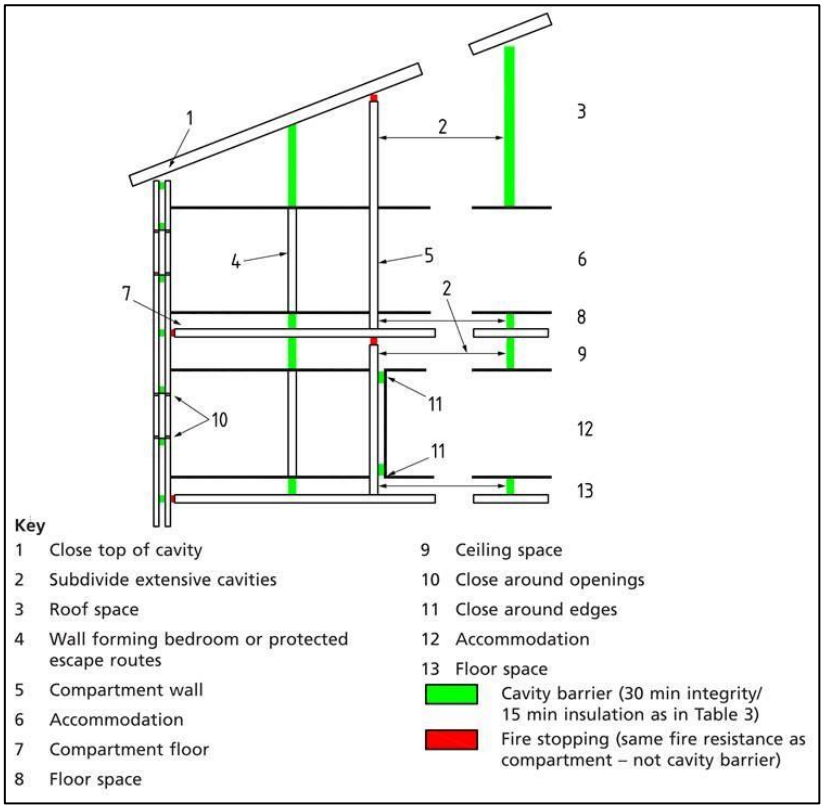


*Figure 7 - Provisions of cavity barriers (taken from BS 9999)*

Cavity barriers will be selected and installed in accordance with clause 33.1 of BS9999: 2017. Cavity barriers should generally meet a minimum fire performance of 30 minutes fire integrity and 15 minutes fire insulation and will be positioned to observe the limits given in Figure 8. Note, the cavity/ concealed space size limitations shown in Figure 8 applies to the external wall construction.

| Location of cavity | Class of surface/product exposed in cavity (excluding the surface of any pipe, cable or conduit, or any insulation to any pipe) | | Maximum dimensions in any direction |
|---|---|---|---|
| | National class | European class | m |
| Between a roof and a ceiling | Any | Any | 20 |
| Any other cavity | Class 0 or Class 1 | Class A1; or<br>Class A2-s3, d2; or<br>Class B-s3, d2; or<br>Class C-s3, d2 | 20 |
| | Not Class 0 or Class 1 | Not any of the above classes | 10 |

*NOTE 1 The national classifications do not automatically equate to the equivalent classifications in the European column, therefore products cannot typically assume a European class unless they have been tested accordingly.*

*NOTE 2 When a classification includes "s3, d2", this means that there is no limit set for smoke production and/or flaming droplets/particles.*

*Figure 8 - Maximum dimensions of cavities*

Cavity barriers should also be provided in external wall construction to close the edges of cavities, including around openings (such as doors, windows, services penetrations, etc) . Cavity barriers should also be provided:

a) at the junction between an external cavity wall (except where the cavity wall conforms to Figure 36 of BS 9999: 2017) and every compartment floor and compartment wall; and
b) at the junction between an internal cavity wall (except where the cavity wall conforms to Figure 36 of BS 9999: 2017) and every compartment floor, compartment wall, or other wall or door assembly which forms a fire-resisting barrier.

Cavities include those created by any rain-screen cladding.

## 3 Summary

This Design Note summarises the relevant requirements as expected under the RIBA Stage 4 Fire Strategy for the Roundhouse Campus Building for the external walls of the building, which includes but is not limited to:

- External wall surfaces to achieve a European class B-s3,d2 or better reaction to fire performance on the external wall of the building facing the Container Building.
- External wall surfaces to achieve a European class C-s3,d2 or better reaction to fire performance on all other external surfaces of the building. Approved Document B guidance permits the use of timber cladding of more than 9mm thickness where a class C-s3,d2 rating or better applies; the proposed timber sleepers are 25mm thick.
- The provision of cavity barriers and fire stopping in line section 5.8 of the fire strategy report and relevant BS9999: 2017 guidance.
- 60 minutes fire resistance to the external wall facing the Container Building as determined by the external fire spread assessment that has been completed as part of the RIBA Stage 4 fire strategy (with reference to relevant BR187: 2014 and BS9999: 2017 guidance).

Overall, it is considered that the RIBA Stage 4 fire strategy for the Roundhouse Campus Building demonstrates that the proposed design can satisfy the relevant Part B Building Regulations 2010 requirements for life safety.