

Housing Health and Safety Rating System (HHSRS)

Case Studies

Group A
Protection Against
Accidents

Hazard A4
Fire and Explosions

Example A4.6
Post-1979
Common parts of
Residential High-rise

Vulnerable Group
All persons aged
60 years and over

Multiple Locations
Yes

Related Hazard A7
Structural Collapse and
Falling Elements

Related Hazard A8
Electrical Hazards

Related Hazard B13
Indoor
Air Pollutants

Related Hazard D18
Crowding and
Space

Dwelling

Description

The building comprises a single block of flats, 12 storeys high. It is understood that the building was originally constructed as an office block in the 1980s, before later being converted into residential accommodation (completed 2017).

The building contains 82 self-contained flats and is mainly constructed using a reinforced concrete frame, with the top three storeys being of steel frame, added during the conversion. Under consideration are the common parts of this building.

Certification

EPC	N/A
Landlords Gas Safety	In place and satisfactory
Landlords EICR	In place and satisfactory
Fire Risk Assessment	Out of date
Building Safety Case	In place



1
Front exterior

Deficiencies

External Observations

Walls

Visual examination of the block and inspection of available documents confirm the external elevations consist of a mixture of ACM cladding panels (estimated at 20% of the total façade), HPL cladding panels (15%), rendered areas (45%), window glazing (15%) and masonry and quarry tiles (5%).

Aluminium Composite Material (ACM)

Grey-and-white coloured ACM panels are present to the façades of the top three floors on the south, west and north elevations. White coloured ACM panels were also present in vertical columns from the ground to 9th floors as well as to balcony facias and soffits.

The panels had an appearance consistent with being ACM. They were approximately 4 mm thick and laminations were observed to the cut edges; they consisted of two metal sheets sandwiching a grey-coloured core.

From one of the balconies, the back of one of the columns clad in white ACM could be observed. Markings identifying the particular ACM product (manufacturer and product name) were noted on the back of the panel.

A cladding report provided by the building owner also identified this ACM product being present to the external walls. According to the BBA certificate for the product, it has a polyethylene core and an Euroclass reaction to fire of D-s1-d0 and is therefore not of limited combustibility. A cladding screening test result report states that two samples of ACM from the building were tested and categorised as Category 2 ACM.

High Pressure Laminate (HPL)

Timber-effect panels are present to the external façades from the ground to 8th floors on the north and south elevations. They are 8mm thick and have the appearance consistent with HPL panels.

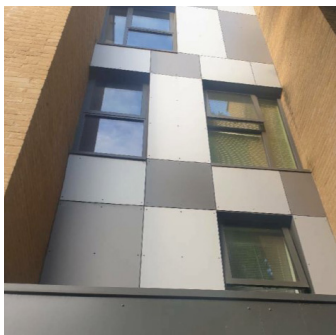
The cladding report identified the particular HPL product used on the building. The BBA certificate for this product states it has an Euroclass reaction to fire of B-s2-d0 and is therefore not of limited combustibility.

Other materials present to the external façades

Rendered areas are present to large areas of the external walls. It appears to be a resin render fixed to the existing substrate. There are also smaller areas of masonry and quarry tiles. This wall system is deemed unlikely to contain combustible materials of concern to the external wall assessment.

Insulation

A cladding survey report for the building states that phenolic foam insulation has been used to the external walls with the product having a Euroclass reaction to fire of C-s1-d0. It is therefore not of limited combustibility. It was also possible to see a product fitting this description being installed on the building in Google Street View's archives.



2
HPL panels compromising
escape stair



3
ACM panel, showing
sandwich of aluminium
sheets and combustible
core.

Deficiencies

External Observations

Cavity Barriers

No documentary or visual evidence has been seen that would confirm the presence of cavity barriers to the external wall systems.

Balconies

The majority of flats have projecting balconies. Combustible composite decking to balcony floors has been laid onto timber joists. Balconies are adjacent to areas of ACM cladding, HPL cladding and render, which could allow a balcony fire to spread to the external walls systems. Balconies are positioned in series (one above the other) at numerous locations around the building. This could allow for fire to spread between balconies.

Windows and Penetrations to External Wall Systems

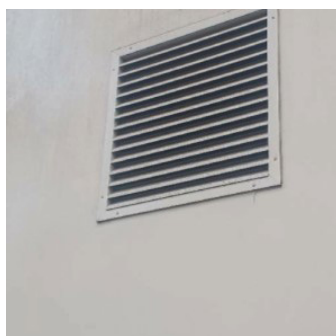
Flats have openable windows that have trickle vents adjacent to ACM and HPL cladding panels. They also have patio doors opening onto balconies. These could be a route for internal fire to spread to the external walls.

Numerous vent terminations are present around the building to ACM and HPL cladding panels. A number of these vents are directly below the ACM soffits to balconies. These are presumed to be for ventilation to flats. No documentation evidencing fire-stopping to these extract points has been seen. The vents could also be a route for fire to spread from within flats to the external walls or vice versa.

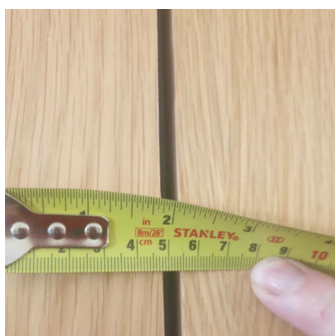
Other External Observations

There is a residents' car park to the rear, with some of the spaces adjacent to ACM and HPL cladding panels to the external walls of the building.

Fire service access to the exterior is limited to the south elevation, which only accounts for approximately 30% of the perimeter. The building is in close proximity to other buildings on two sides. The residents' car park at the rear is not large enough for a fire engine to manoeuvre and put down stabilisers to undertake high-reach functions.



4
External penetrations to
ACM cladding



5
Excessive gap to service
cupboard doors

Deficiencies

Internal Observations

Compartmentation

The following problems with compartmentation were noted:

There is a service shaft containing hot water pipes rising from the basement plant room to the top floor. The shaft is not fire-stopped at its base at the points where the pipes penetrate the ceiling of the plant room. In the stairwell at ground-floor level is an understairs cupboard containing a non-fire-resisting service hatch to the shaft. The door to the cupboard is not a fire door. A fire in the plant room could therefore spread up the riser and fill the staircase with fire and smoke.

Inadequately fire-stopped service penetrations are present between several service cupboards and routes of escape.

The walls between service cupboards and corridors are constructed with a steel framing system. The steel framing system in some of the cupboards is unprotected from fire on the inner side, which could allow it to fail in the event of a fire, causing it to spread to the means of escape.

Means of Escape

There is a single staircase serving the building. There are openable windows to the staircase, which are adjacent to ACM and HPL cladding. If a cladding fire occurred, this could impact the escape stairs.

There are two exit doors from the building, one onto the street at the front of the building and one into the external car park at the rear.

The exit door onto the street at the front of the building is an automatic sliding door. There is no over-ride for this door in the event of a loss of local power to the automatic motors. Sliding doors are not suitable as fire exit doors according to the Fire Safety Order.

From the car park, exit is through a set of automatic gates. The gates can be overridden to operate as manual gates, but there are no signs informing occupants of how to do this. This route is an unsuitable fire exit and escape route as there is no clear way for escaping occupants to reach an ultimate place of safety.

Fire Signage

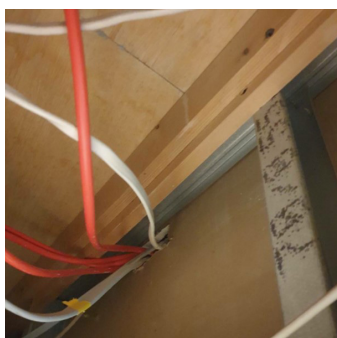
Maintained, illuminated directional signs were noted in each residential lobby directing occupiers to the stairwell.

Fire doors

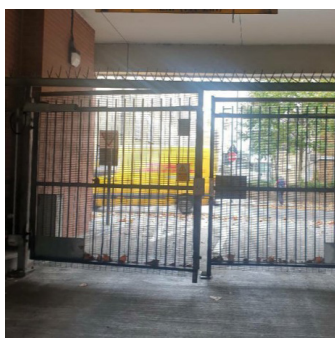
Doors to staircases, communal lobbies and service cupboards are marked as FD60 and entrance doors to flats were marked as FD30. The doors appeared satisfactory on the whole, although defects were noted to a few (both communal doors and flat entrance-doors), such as excessive gaps between door leaf and frame.

Fire doors between the staircase and residential corridors are fitted with air-transfer grille vents. It is not known if the doors were tested with the inserted grilles to give them the FD60 rating. A door is unlikely to perform to an FD60 rating if the grille/vent was added subsequent to its rating.

The overhead self-closing device to the plant room door had been disconnected and a hole was noted in the door. In its current state the door would not provide a barrier to fire or smoke.



6
Unprotected framing and penetrations to service cupboard



7
No signage informing how to manually override car park gates

Deficiencies

Internal Observations

Smoke control system

To the head of the staircase is an automatic opening vent (AOV), which was actuated by a smoke detection system. There is also mechanical extraction with louvred vents to the residential corridor on each floor. These are triggered by the smoke detection system.

The doors between the staircase and residential corridors have mechanical louvred air-transfer grilles that appeared to be operating incorrectly; this is because the grilles are in the open position until closed, and it is in the closed status that the smoke detection is activated. It is likely that the intended design for the grilles was for them to be in the closed position until opened on activation of the smoke detection system, allowing a flow of air from the staircase AOV, through the vent in the door, to be extracted (along with any smoke) by the mechanical extraction to the residential corridors. No documentation has been seen detailing the objective of the smoke ventilation system, nor any explaining why the vents in the doors have been set up in this way. Currently, the open vents compromise the integrity of the fire doors and the closing of the vents during a fire could reduce the effectiveness of the smoke ventilation system due to lack of an air inlet to provide make-up air to the corridor when air is being mechanically extracted. (This said, given that the doors - opening into corridors from the staircase - are likely to be pulled open by the negative pressure in the corridor, a source of inlet-air would be provided anyway).

The exhaust (from the mechanical extraction vents) was observed on the roof to be approximately 5 m from, and pointing towards, the staircase AOV. There is a possibility under certain climatic conditions (depending on wind strength and direction, for example) that extracted smoke could re-enter the building, being drawn in through the AOV at the head of the stairs.

Fire alarm and detection system

In a building with a stay-put evacuation policy such as this, a lack of communal fire alarm and detection system might be considered standard practice. However, in view of the presence of combustible cladding, such a system would alert residents to a cladding fire, thus reducing the likelihood of this type of fire causing harm. Hence, a system of this type is recommended for such buildings (see NFCC guidance).

There are mains-wired smoke and heat alarms fitted in risk rooms in all flats inspected.

Sprinkler system

Flats have been provided with sprinkler heads in open-plan living rooms/kitchens and in bedrooms, all fed from a tank in the plant room via a pumped system. The presence of a sprinkler system reduces the risk of an uncontrolled fire developing in the flats. No test certificates were seen for the sprinkler system.

Emergency lighting

Emergency lighting is present to common areas, and an up-to-date test certificate stated the system was satisfactory.

Lift

The building contains two lifts, one of which is a firefighting lift.

Some uncertainties over the operation of the lifts were noted. The service engineer raised concerns with the building manager/RP regarding a malfunction of the lift when there was a power cut. It is of note that when ascending, if a power cut were to occur, the delay in the time taken for the generator to provide power to the lift would cause the lift safety features to operate. This effectively disables the firefighting lift pending attendance by an engineer, which, in the event of a fire, could be both dangerous and cause delays. It was noted that a quote for remedial works been accepted by the RP and they await a start date.

Dry risers

Deficiencies

Internal Observations

There is a dry rising main in the building. A test certificate was seen for the dry riser system, stating that it was satisfactory.

Fire risk assessment (FRA)

An out-of-date fire risk assessment was provided. This expired two years prior to this inspection date.

The risk assessment mentioned that a number of issues remain outstanding. These include:

- No premises information on site for fire service personnel
- Inadequate provision of emergency evacuation plans
- Lack of fire signage
- Lack of smoke strips and intumescent seals to fire doors of service risers
- The presence of Category 2 ACM.

These issues had not been addressed some two years later.

Relevant Baseline Indicators

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

Subject	Score	BI	Baseline Indicators
8 Internal Doors	0 1 2 3	8.1	Internal doors leading between areas of a single dwelling must provide a sufficient barrier to the spread of smoke and fire, any glazing must respond safely to collision, and must be designed for functionality to avoid strains or entrapment when in use and must be maintained in good repair. All bathrooms and WC doors must be fitted with a suitable lock and not contain clear glass.
19 Fire Safety	0 1 2 3	19.4	The electrical installation should have been inspected and tested within the last 5 years.
	0 1 2 3	19.5	There should be sufficient, properly designed and appropriately sited smoke and heat detectors with alarms in every dwelling. These should be properly maintained and regularly tested.
	0 1 2 3	19.7	Egress through doors/windows that are required for means of escape should not require the use of a key or a code.

Other Relevant Matters

Considerations

The assessor is to consider the likelihood of a fire igniting within the scenario presented and the likelihood of whether that fire can become uncontrolled. The outcomes relate to the impact of the fire to persons, which is to include the effects of smoke inhalation.

The assessor is to consider the likelihood of an explosion occurring and its source and whether that explosion is also likely to lead to a fire ignition and the outcomes are impacted by the location of the explosion and the provisions within the building to contain the explosion.

Please see Part 3 of the Operating Guidance for explanations of the relevant matters.

Likely Fire Scenarios

If a fire started in the basement plant room, with the lack of fire stopping between the hot water service shaft and the basement ceiling, the non-fire resisting service hatch between the shaft and the understairs cupboard at ground floor level and the lack of a fire door between this cupboard and the staircase, the staircase would become inadequate for evacuation or firefighting due to the spread of fire and/or smoke.

Due to the proximity of the cars and generator to the building an external fire spreading to the building is possible. A similar scenario involving an external cladding fire could be started by a barbecue being used negligently on a balcony in close proximity to the cladding present to the balconies.

The installation of sprinklers has reduced the risk of a flat fire spreading (although no evidence of recent testing of the sprinkler system was seen). However, if a window were open there is a lower chance that fire might spread to the cladding (and/or to an adjacent flat).

Fire involving the external envelope of the building (due to a fire starting on a balcony, for example) could break into multiple flats simultaneously (or over a short period of time), operating multiple sprinkler heads, and possibly overwhelming the sprinkler water supply. If the water supply to the sprinkler system is overwhelmed, subsequent flats impacted by the fire will have no sprinkler system protection. If a fire spread to the external wall system on the rear of the building it could enter the escape route directly through any windows left open on the staircase.

If the electrics failed during a fire it could render the front door escape route unopenable and locked shut compromising one of the two escape routes.

Other Relevant Matters

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

Matters affecting Likelihood of Harm

0	1	2	3
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 Electrical sources of ignition

0	1	2	3
---	---	---	---

 Smoking management

0	1	2	3
---	---	---	---

 Potential for arson

0	1	2	3
---	---	---	---

 Accidental fire spread

0	1	2	3
---	---	---	---

 Cooking provision

0	1	2	3
---	---	---	---

 Fixed heating

0	1	2	3
---	---	---	---

 Lightning

0	1	2	3
---	---	---	---

 Laundry facilities

0	1	2	3
---	---	---	---

 Multiple occupation and
overcrowding

Matters affecting both Likelihood and Harm Outcomes

0	1	2	3
---	---	---	---

 Escape route

0	1	2	3
---	---	---	---

 Dwelling layout

0	1	2	3
---	---	---	---

 Travel distance

0	1	2	3
---	---	---	---

 Operation of exits

0	1	2	3
---	---	---	---

 Obstructions

0	1	2	3
---	---	---	---

 Non-fire resisting fabric – allowing
fire to spread.

0	1	2	3
---	---	---	---

 Smoke permeable fabric – allowing
smoke to spread.

0	1	2	3
---	---	---	---

 Fire stops to cavities – lack of,
allowing fire to spread.

0	1	2	3
---	---	---	---

 Disrepair to fabric – walls, ceilings
and/or floors may allow smoke,
fumes and/or fire to spread.

0	1	2	3
---	---	---	---

 Internal doors – insufficient doors or
doors of inappropriate materials or
ill-fitting doors.

0	1	2	3
---	---	---	---

 Fire-resisting construction (including
any glazing) protecting escape routes

0	1	2	3
---	---	---	---

 Measures to ensure that fire-
resisting doors are maintained in the
closed position

0	1	2	3
---	---	---	---

 Smoke Control

0	1	2	3
---	---	---	---

 Artificial lighting

0	1	2	3
---	---	---	---

 Levels of compartmentation

0	1	2	3
---	---	---	---

 Provision of appropriate Fire Safety
Signs

0	1	2	3
---	---	---	---

 Fire Detection and Alarm Systems

Other Relevant Matters

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

0 1 2 3 Provision of fire-fighting equipment

0 1 2 3 Fire suppression system

Matters related to cladding

0 1 2 3 Condition of cladding

0 1 2 3 Combustibility and fire performance
of external wall construction and
cladding

0 1 2 3 Location and adequacy of cavity
barriers

0 1 2 3 Presence/maintenance of dry/wet
rising mains

0 1 2 3 Presence/maintenance of Firemen's/
Firefighting/Firefighters lifts

0 1 2 3 Access arrangements to the site and
the building for the fire and rescue
service

0 1 2 3 Balconies

Matters related to explosions

0 1 2 3 Unauthorised gas supply

0 1 2 3 Siting of gas tanks

0 1 2 3 Ventilation

0 1 2 3 Hot water storage tank

0 1 2 3 Vented hot water system

0 1 2 3 Unvented hot water system

Likelihood of Harm

Scale Points Likelihood of harm from this hazard over the next twelve months	
Very Likely	1 in 1
	1 in 2
	1 in 3
	1 in 5
Likely	1 in 10
	1 in 20
	1 in 30
	1 in 50
Unlikely	1 in 100
	Example Dwelling 1 in 200
	1 in 300
	1 in 500
Very Unlikely	1 in 1,000
	1 in 2,000
	National Average 1 in 3,000
	1 in 5,000
Score 1 in 200	

Justification of Scoring
Likelihood of Harm

Whilst likelihood of ignition of fire is no greater than average (apart from the location of the car park), rapid spread of fire (uncontrolled) is much more likely due to the external wall system, the possibility of balcony fires and a fire in the basement affecting the means of escape. This is compounded by fire-stopping and fire door issues, increasing the likelihood of fire spread.

There is some mitigation with sprinkler systems in flats, though sprinklers are not designed to tackle fires in multiple flats, which is a possible scenario in a cladding fire, and could risk the system being overwhelmed. There is therefore a significant increase the likelihood of the vulnerable group being harmed by an uncontrolled fire over the next 12 months.

Harm Outcomes

Extreme		Severe		Serious		Moderate	
Death, permanent paralysis, etc.		Heart attack, serious fractures, etc.		Chronic stress, severe concussion, etc.		Broken fingers, moderate cuts, etc.	
Very Likely	50.0	Very Likely	50.0	Example Dwelling	50.0	Example Dwelling	29.5
	30.0		30.0		30.0		90.0
Example Dwelling +	20.0		20.0		20.0	These scores are simply calculated as the sum of the other three harm outcomes subtracted from 100%	
Likely	10.0	Likely	10.0	Likely	10.0		
National Average	5.0		5.0	National Average	5.0		
	2.0		2.0		2.0		
Unlikely	1.0		1.0	Unlikely	1.0		
	0.5	Example Dwelling	0.5		0.5		
	0.2		0.2		0.2		
Very Unlikely	0.1	Very Unlikely	0.1	Very Unlikely	0.1	Score	
	0.0	National Average	0.0		0.0		
Score		Score		Score		Score	
20.0%		0.5%		50.0%		29.5%	

Harm Outcomes

Justification of Scoring

Harm Outcomes

The presence of an uncontrolled fire is likely to result in the rapid spread of smoke, heat and flame due to issues concerning the following: the external wall system; balcony materials; compartmentation; fire doors; and the smoke management system. The building retains a 'stay put' policy in spite of the risks posed by the external wall systems, meaning that people are likely to stay in their flats rather than escape. No interim measures such as an alarm system or temporary move to a simultaneous evacuation strategy have been employed. This increases the risk of 'Extreme' harm outcomes such as death because of the delay to evacuation that would lead to people being overcome by fire and smoke. This is especially true if the means of escape becomes compromised.

There are also issues with the firefighting lift, information provided for firefighters and matters relating to onsite management, which will hinder the fire and rescue service in tackling the fire and evacuating when required, increasing serious harm outcomes. However, there are a few features that mitigate the harm, these being the emergency lighting, some signage aiding evacuation and the sprinkler system in flats.

The provision of a stay-put policy suggests there are unlikely to be personal evacuation plans for disabled occupants or those with restricted mobility, which would result in firefighters having to check every flat in the building.

Safety Ratings

Scenario 1
As described in this document

Key

Category	Band	Score
1 Legal duty to take action	High	10,000
2 Discretion to take action	Medium	1,000
	Low	100

Likelihood of Harm 1 in 200			
Extreme 20.0%	Severe 0.5%	Serious 50.0%	Moderate 29.5%
Category	Band	Score	
1 Legal duty to take action	High	10,000	
Example Dwelling		1,079	
2 Discretion to take action	Medium	1,000	
		100	
	Low	17	
	National Average		
Score			
1,079			

Scenario 2

After works meeting baseline indicators

Likelihood of Harm
1 in 300

Extreme	Severe	Serious	Moderate
20.0%	0.5%	50.0%	29.9%

Category	Band	Score
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1 Legal duty to take action	High	10,000
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2 Discretion to take action	Medium	1,000
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**Example
Dwelling**

719

Low 100National
Average

17

Score**719****Scenario 3**

After further improvements

Likelihood of Harm
1 in 3,000

Extreme	Severe	Serious	Moderate
5.0%	0.0%	5.0%	90.0%

Category	Band	Score
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1 Legal duty to take action	High	10,000
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2 Discretion to take action	Medium	1,000
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Medium

1,000

Low 100**Example
Dwelling +
National
Average**

17

Score**Justification of Scoring**

After works meeting baseline indicators

Compliance with BI 19.7 would require an override function to be installed to the exit door onto the street at the front of the building, so that it can be opened in the event of a loss of local power to the automatic motors. Whilst the gates from the car park can be overridden, signage is needed to instruct how this can be achieved.

The improvement to the means of escape that these works will achieve will reduce the likelihood, but not back to the average. Further works are needed to achieve a satisfactory reduction.

Justification of Scoring

After further improvements

Works beyond the BIs would be necessary to reduce the risk adequately. A properly conducted FRA and compliance with BIs would see replacement of combustible external wall systems. There would be an overhaul of the smoke management system to ensure that all is orientated correctly and functioning properly. Fire doors need to be replaced to the plant room as well as gaps around services being fitted with intumescent collars. All of these measures will reduce the likelihood of uncontrolled fire, smoke, heat and flame travelling throughout the common parts. A SIB, information and signage would be improved as well as the issues with firefighting lift being remedied.

Other Relevant Legislation and Guidance

Updates

Matters for consideration listed in this section were correct at the time of publication. For the most up-to-date legislation and guidance in these areas, please visit the [gov.uk](https://www.gov.uk) website.