



Housing Health and Safety Rating System (HHSRS)

Case Studies

Group A
Protection Against
Accidents

Hazard A4
Fire and Explosions

Example A4.1
Common Parts of
Post-1979 High-rise
Residential Building

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

This is a 16-storey tower-block (over 30 m high) with 5 or 6 flats on each floor above the ground-floor entrance lobby with mailbox area and concierge desk. The flats are residential, built in 2012, and under consideration are the common parts therein.

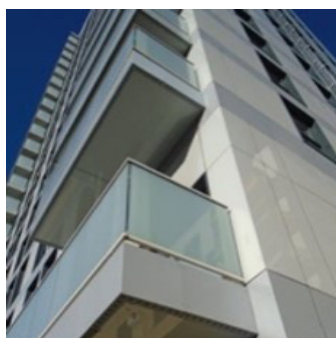
There are 2 lifts and 2 staircases to all floors. One of the set of stairs is a firefighting shaft with FD60S doors and a firefighting lift. This terminates at the main entrance, which also contains a concierge desk and mailboxes. The second set of stairs has a separate termination point through an alarmed fire exit that opens onto a concreted utility space.

Access is via a video-entry phone system and there is a caretaker system to ensure the common areas are kept clean and waste is stored properly. Refuse disposal is via chutes in enclosed lobbies on each floor behind FD30S fire doors off from the common landings. Refuse is stored in a locked area at ground level. The caretaker manages the refuse storage area, which is a metal structure with open sides and a metal lean-to roof. The storage area is within half a metre of the building's façade.

There is a communal heating system that uses electricity; gas is not supplied to the building.

Plant rooms are adjacent to the building and contained in a separate concrete structure with a common corridor giving access to separate plant areas containing sprinkler tanks, heating plant, electrical intake, etc. These are naturally vented to the roof of the plant area. The doors to the plant rooms open onto a concreted area. Cabling and piping pass from the plant areas into the building and travel up open riser shafts, with doors to the shafts on each floor in the block.

There is an external bike area housed in a metal, open lean-to construction.



1
Front exterior

The entrance doors to all the flats are FD30S door sets. Both the individual flats and the common parts are fitted with a sprinkler system. Note: It is unusual for sprinklers to be fitted to the common areas of this form of development. There is an automatic detection and alarm system throughout the common areas of the building, which is regularly tested. It does not have sounders as it is built to trigger the smoke extraction system. There is no direct link to the fire and rescue service; this is not a requirement. The fire alarm panel is next to the concierge desk to allow for monitoring, though not 24 hours. Heat (kitchen) and smoke (hall) detection is provided to each individual flat (BS 5839- Part 6 – LD2 system). The landings and staircases have sufficient emergency lighting, all of which is kept in good order. There are signs on every landing setting out what to do in case of fire. The development has adopted a 'stay put' policy.

There is a wet-riser system that is fully charged and a mechanical smoke extraction system, and AOVs at the head of each staircase and fire dampers on all levels. These have been tested and found to work satisfactorily.

The area around the building has adequate lighting and there is access to the site for fire services from the rear of the building, giving access to at least 40% of the building façade. The front of the building faces onto a main road. There is sufficient fire hydrant provision to both areas.

The building is under the control of a residents' management company (RMC), which is an agreement put in place between the freeholder and leaseholders at the time the development was completed. The RMC have in turn appointed a management company to oversee maintenance/management.

A number of the flats throughout the building are given over to affordable housing with a single registered provider in control of these flats.

Certification

EPC	N/A
Landlords gas safety	N/A (no gas)
Landlords EICR	N/A
Fire risk assessment	In place
Building safety case	In place

Deficiencies

Fire risk

The external wall system comprises aluminium cladding material (ACM): Category 3 rainscreen panelling, behind which is an Ethylene Propylene Diene Monomer (EDPM) layer, and then unmodified polyethylene insulation filler within the cavity. This then abuts the concrete internal structure. An intrusive survey confirmed the presence of cavity barriers and window closers within the cavity.

The open-sided bin store is within half a metre of the external wall system.

Every flat has at least one balcony, each being a cantilevered concrete construction with the soffits and lower parts of the balustrading lined with ACM panels. The flooring is timber decking. Barbecues were noted on some balconies.

There are no interim measures in place in the event of a cladding fire. No certification or management logs for any of the fire safety features of the building were available. This was similarly the case for the EICR certificate for the common parts of the building.

Horizontal service penetrations were identified with some of the riser cupboards.

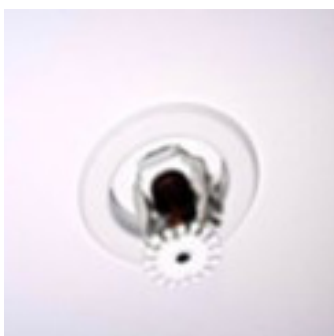
Some common fire doors were found to be ill-fitting, having excessive gaps to the head and jambs. A number of the hinges had missing screws.

The second set of fire-exit stairs has a narrow width (only 600mm). The accompanying exit door has an unlabelled push bar and is difficult to operate.

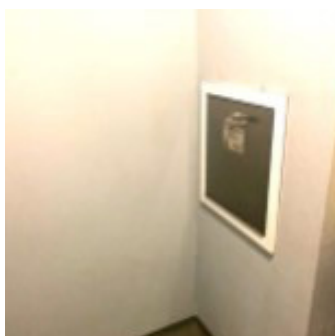
There is no secure information box present in the lobby and no wayfinding signage is present. A recent Type 1 fire risk assessment was carried out. This did not identify any issues and indicated no further action was necessary.

Explosion risk

The building's ventilation system (extraction gases/ vapours from bathrooms, kitchens, etc.) incorporates non-fire-rated ducting penetrating the internal concrete wall from each flat into the cavity between the building and the cladding. The penetrations are not collared. There does not appear to be further ducting to the external air, allowing for the build-up of water vapour and other ventilation products within the enclosed cavity.



2
Sprinkler head in
landing ceiling



3
Refuse chute

Relevant Baseline Indicators

0

Satisfactory
or N/A

1

Not
Satisfactory

2

Defective

3

Seriously
Defective

Subject	Score	BI	Baseline Indicator
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 (where appropriate). Any glazing in doors 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 room doors must be fitted with a suitable lock and must not contain clear glass.
11 Security	0 1 2 3	11.1	Adequate external lighting shall be provided to all means of access including entrances and external refuse stores, providing good visibility when there is no daylight.
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.

Other Relevant Matters

Consideration of likely fire/explosion scenarios

The assessor is to consider the likelihood of a fire igniting within the scenario presented and the likelihood of that fire becoming uncontrolled. The outcomes relate to the impact of the fire to persons, and includes 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. These outcomes are dependent upon the location of the explosion and the provisions within the building to contain the explosion.

Likely fire scenarios

The worst-case scenarios for this building are related to fires involving the external wall system or to severe fires inside (e.g. from within a flat) that would spread to the wall system and, from there, potentially extend around the building. A fire of this nature and scale would probably be capable of breaking back into the building through the windows of other flats. Such a scenario is mitigated by the presence of cavity barriers and sprinkler systems; however, cavity barriers are likely to fail and multiple fires will probably quickly overwhelm the sprinkler system.

Similar consequences are likely from a fire involving a balcony or the bin store. Although the concrete structure of the balconies would hinder 'balcony to balcony' fire jumping, the presence of the EWS and ACM panels to the balconies is likely to lead to vertical fire spread.

The unvented vapour and other ventilation products present both a fire and explosion risk, and a fire within the EWS could lead to an explosion with the cavity, increasing fire spread and potentially damaging the structure of the building. Explosions are likely to create openings within the structure to allow for fire to spread back into the building. An explosion is also likely to lead to parts of the EWS being blown off the building, creating falling-element risks.

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

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
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 Multiple occupation and
overcrowding

Matters affecting both Likelihood and Harm Outcomes

0	1	2	3
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 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
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 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
	1 in 200
	Example Dwelling 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 300

Justification of Scoring
Likelihood of Harm

The presence of Category 3 ACM cladding to the main façade and soffits of balconies (some with barbecues) plus the combustible insulation beneath the external cladding creates a greatly increased likelihood of an uncontrolled fire spreading to the external parts of the building. This would compromise the ‘stay put’ evacuation strategy. The explosion risk within the cladding system exacerbates this, and the location of the bin store in such close proximity to the cladding increases the likelihood of ignition and uncontrolled spread.

Although sprinklers would help mitigate an uncontrolled fire, these are likely to become quickly overwhelmed in the event of external spread of fire, their design and functionality being ill-equipped to deal with this type of situation.

Internally, the gaps in riser cupboards will allow the spread of combustion products to pass through the entire building with relative ease. Some defective fire doors, whilst not seriously defective, would nevertheless contribute to possible exposure to smoke through the common parts.

The overall combined effect of these defects presents a concern and the likelihood has been increased as a result.

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	Very Likely	50.0	Example Dwelling	70.0
	30.0		30.0		30.0		National Average
	20.0		20.0		20.0		90.0
Example Dwelling	10.0	Example Dwelling	10.0	Example Dwelling	10.0	These scores are simply calculated as the sum of the other three harm outcomes subtracted from 100%	
National Average	5.0		5.0	National Average	5.0		
	2.0		2.0		2.0		
Unlikely	1.0	Unlikely	1.0	Unlikely	1.0		
	0.5		0.5		0.5		
	0.2		0.2		0.2		
Very Unlikely	0.1	Very Unlikely	0.1	Very Unlikely	0.1		
	0.0		National Average		0.0		
Score		Score		Score		Score	
10.0%		10.0%		10.0%		70.0%	

Harm Outcomes

Justification of Scoring

Harm Outcomes

The presence of combustible external wall systems combined with a stay-put policy significantly increases the risk of occupants living on higher floors becoming overcome by smoke and being unable to escape or suffering from smoke inhalation and serious burns in the event of a serious cladding fire, increasing 'extreme' and 'severe' harms.

There are no interim measures in place that would alert residents in the event of a cladding fire. The fire safety documentation also provides cause for concern as some information is missing and other notes appears not to have been actioned. This raises concerns around management and therefore maintenance of the building and testing of systems. The narrow width of the second escape stairs would also result in a slower rate of egress for occupants, increasing 'serious' harms.

Whilst the two internal fire escape routes are protected with a sprinkler system, smoke extraction system and fire doors, the implementation of a stay-put policy, combined with defects to some fire doors and lack of interlinked audible fire alarm system means fire compartmentalisation and the opportunity to escape could be compromised. A secondary fire escape with a narrow and difficult-to-open door will slow the rate of escape and increase the risk of crushing injuries if the building is quickly evacuated.

In terms of day-to-day living, occupants are likely to suffer from significant mental distress upon becoming aware of the high fire risk associated with the external cladding system on the building, impacting 'severe' and 'serious' harms.

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 300

Extreme 10.0% Severe 10.0% Serious 10.0% Moderate 70.0%

Category	Band	Score
1 Legal duty to take action	High	10,000
2 Discretion to take action	Medium	1,000
Example Dwelling		379
	Low	100
National Average		17

Score
379

Scenario 2

After works meeting baseline indicators

Likelihood of Harm
1 in 300

Extreme 10.0%	Severe 10.0%	Serious 10.0%	Moderate 70.0%
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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	379
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Low	100
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National Average	17
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Score

379**Scenario 3**

After further improvements

Likelihood of Harm

Extreme 5.0%	Severe 0.0%	Serious 5.0%	Moderate 90.0%
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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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Low	100
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Example Dwelling + National Average	17
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Score

17**Justification of Scoring**

After works meeting baseline indicators

Compliance with the BIs would not achieve a significant improvement as the specific defects present are not covered by the BIs. The electrical system would be inspected and tested, but this would not resolve the issues posing the greatest risk of fire.

Justification of Scoring

After further improvements

Improvements to the management of the building are required to ensure that instruction is given around appropriate use of balcony areas, and ensuring that relevant paperwork and certification is in place, including the provision of a SIB and appropriate fire signage. A new fire risk assessment should be undertaken by a competent fire risk assessor, and all action plan items identified should be addressed. This will incorporate the following items: repair/replacement of any faulty fire doors, effective compartmentation installed in all areas where it is deficient (for example the riser cupboards) and fire proofing of the bin store. The buildings ventilation system requires alteration to ensure that water vapour and other ventilation products cannot build within the cavity. Interim measures may be required in the event of a cladding fire until the cladding can be removed.

Other Relevant Legislation and Guidance

Building regulations

The HHSRS is a risk-based assessment system focusing on how people can be harmed through their interaction with the individual circumstances present in a particular dwelling. By contrast, building regulations are building-focused acceptable solutions provided by approved documents indicating minimum standards to achieve compliance. As such, although properties may be compliant with the more prescriptive building regulations, and while compliance may usually be considered a positive indicator in the assessment of risk, there can be occasions where individual circumstances allow risk to prevail.

Dwelling perspective

When assessing multiple dwellings in the same building, due consideration may need to be given to the level of risk posed to different flats within a building. The likelihood of an occurrence and harm outcomes resulting from an occurrence may vary significantly for many hazards, depending on the location of the flat within a building.

Leasehold properties

In a leasehold property, there may be restrictions on works that can be carried out without the freeholder and management company's express approval. This could include, for example, alteration of doors and windows as well as maintenance of the structure of the building (e.g. the roof).

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.