www.bre.co.uk

Department for Levelling Up, Housing and Communities
Final Report

Fire Safety: Construction Technologies, Design and Usage

Prepared for:	**Department for Levelling Up, Housing and Communities**
Prepared by:	**Paul Johnson, Julie Bregulla, Manvir Singh, Karen Heywood, Corinne Williams**
Approved by:	**Roger Harrison on behalf of BRE Global**
Date:	**20th February 2023**
DLUHC Contract:	**CPD/004/121/082**
Report Number:	**P118434-1006 (M6D6V1) Volume 2 (of 2)**

BRE Global Ltd
Watford, Herts
WD25 9XX

Customer Services 0333 321 8811

From outside the UK:
T + 44 (0) 1923 664000
E enquiries@bregroup.com
www.bregroup.com

The project was commissioned by the Ministry of Housing, Communities and Local Government (MHCLG), which later became the Department for Levelling Up, Housing and Communities (DLUHC). Following the formation of the Building Safety Regulator (BSR) within the Health and Safety Executive (HSE), oversight of the research was transferred to the HSE. This report is published by the HSE; it contents, including any opinions and conclusions expressed, are those of the authors alone and do not necessarily reflect MHCLG or HSE policy.

Queries on this report should be sent to bsrcorrespondence@hse.gov.uk.

If you have any enquiries regarding this document/publication, email bsrcorrespondence@hse.gov.uk or write to us at: Building Safety Regulator, Health and Safety Executive, Redgrave Court, Merton Road, Bootle, Merseyside, L20 7HS.

Table of Contents

1 Introduction

This Final report is delivered as part of the Department for Levelling Up, Communities and Housing (DLUHC) (formerly the Ministry of Housing, Communities and Local Government (MHCLG)) project titled “Fire Safety: Construction Technologies, Design and Usage”, DLUHC Contract reference CPD/004/121/082.

This report contains a compilation of the findings of the Objective A review of modern construction technologies and trends in design and building use and the Objective B review of the current provisions in AD B considering the application of modern construction technologies and trends in design and building use. This report provides draft options/recommendations for potential future work to address the identified issues and the challenges to AD B.

This report has been prepared in two volumes, Volume 1 and Volume 2. These volumes are intended to be read in conjunction with each other and not independently.

Volume 1 contains the main part of the report. Volume 2 contains the Appendices (A to H).

bre

Appendix A Table capturing evidence supporting the themes

This Appendix presents a table which captures the evidence supporting each theme.

	Key: Grey shading = derived from 'construction technology' tower (4 grouped comments) + ungrouped 'detailed comments' in the box beneath Unshaded = derived from 'design' tower (12 grouped comments) Blue shading = derived from the ungrouped 'detailed comments' in the box beneath the 'design' tower Beige = derived from 'building uses' tower (5 grouped comments) + ungrouped 'detailed comments' in the box beneath											
Tall building+ single stair												
Drivers	Preference for city living (urbanisation), shortage of homes, congested city plots, less space per occupant/overcrowding, vertical cities, need for multi-functional purpose, limited outdoor spaces, ageing society (living at home for longer), shared car pools											
Leading to	High and super high-rise construction, vertical cities with multi-functional uses incorporated in one building, need for common communal spaces, use of balconies, space saving single stair and complex underground construction for car parks, storage etc, assisted living, layouts for increased mobility, layouts to optimise space (i.e. cooking close to fire exit), enclosed residential corridors, driverless cars, shared car pools, over cladding, overheating of apartments											
Glulam, Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Alternative materials and systems	Volumetric or panelised	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	Modular construction including joints and cavities	Living roofs green, brown and blue	Unitised cladding panels	Pod construction	Brick slip systems Plastic tiling on walls
Insulated render systems	Increased use of open state cavity barriers Could closed state barriers be detailed with correct DPC (damp-proof course) membrane and weep hole detailing?	Curtain walling	Large composite panels: metal/mineral wool/metal	Low carbon concrete unknown fire behaviour	Full building constructed using light steel frame	Irregular profiles for cavity barriers	Should there be height limitations, even where and external walling 'system' meets the performance requirements of BR135?	Need to accommodate ventilation ducts in façade	Battery powered detectors	Increased use of water mist	Smoke exhaust, smoke control Leakage and actuation of fire dampers and AOVs	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and

												presence of services may affect smoke movement?
Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	Evacuation alert systems Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Shared water supplies… suppression on wet mains Can BS 9251 Automatic Fire Suppression Systems (AFSS) be extended to cover other areas?	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Evacuation alert systems	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Tall buildings/ city living Single stairs Open plan flats What is the maximum length of 'extended corridor' in residential buildings? Single Staircase being extended down to basement	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks? Also, purpose group review	Podium design	Increased home working leading to residential and commercial 'combined' uses Also, consider mixed use in high and very high buildings	MMC realistic test regime Fire resistance where construction is combustible
Fire resistance of roofs (warm, Inverted, green, brown, blue) Also, roof covering tests need review	Definition of common building When is a building too tall?	Product substitution without due consideration - golden thread	Compartment size limits	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6 Smoke detection references need review	Private lift shafts breaching compartments	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Multiple, deep, complex-layout basements Means of Escape and Ventilation?	Life safety power supplies clear requirements needed	Hard stop at 18m? What about 17.99m tall?	Resilience in terms of number of firefighting lifts	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7
Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Design justice Co-designed **by** those affected not designed for them	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions? What constitutes a cavity in a façade? What constitutes a surface? Glazing fixity	Some old terminology Will we revert to National class standards BS or European Normalised EN for standards? Extended application certificates needed	Cavity barriers and fire stopping The provisions are still misunderstood Hidden fire spread still a threat	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Backing wall fire resistance Thermal bridging issues?	Compromise of structural lo AD B bearing connections in fire	Disproportionate collapse as result of a fire event

								Fire spread from rooflight in low-level roof to external wall above				
Review of the 0.4m^2 ventilation provisions for ancillary spaces needed	Firefighter access relative to fire location How far to travel internally to the stair? Transfer corridors… how intuitive are they and how appropriate are they for firefighters having to carry kit? How far is too far?	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	Future Building Safety Regulatory regime for High Risk Residential Buildings (HRRBs)	Misconception Regulation 38 is being enforced	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	***Fire and Rescue Services Arrival and set up:*** First responders in danger - Debris field? Should riser diameters to be increased to 150mm? Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	***Arrival and set up continued:*** Should premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to BS 8579 needed More guidance on insulated inset balconies needed	Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play Removal of PAS 79 for Residential More guidance needed	Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed
Performance in fire should be a combination of reaction to fire and fire resistance, not just fire resistance Consider simple ways of achieving this	Where BR135 and BS 8414 routes to compliance are still 'available', the test rig should be constructed using average skill and care The build should not be	Test all walls to BS 8414 Do not accept A1 and A2 materials alone as the wall may still fail if not built correctly	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Plastic tiling	Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna	Access for firefighting small roads tall buildings	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO)	Can Ambulance Service make a rescue using a stretcher? Are lifts suitable to accommodate a stretcher?	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair	Assumptions regarding low occupancy during day may no longer be valid (home working - pandemic)			

	constructed using 'heightened' skill levels		Re-wilding movement	be to a building alarm? Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility and cognitive considerations ?		Guidance needed House/flat but used as holiday home House/flat but used as Airbnb hotel House/flat but used as apart-hotel		Residents trusting intuition not authority Residents responding to social media and WhatsApp groups				
Complex footprints												
Drivers	Preferences for city living (urbanisation), congested city plots, homes shortage: less space per occupant/overcrowding, need for private amenity spaces, limited outdoor space (including balconies), shared car pools, government policy											
Leading to	Single stair (and connections to ancillary areas from single stair), deeper complicated basements, different firefighting requirements, insufficient management requirements, super high-rise construction, different structural forms, more complex escape provision requirements (such as escape provisions for disabled occupants), podiums, more communal space, more open plan flexible layouts and proximity of living functions to escape (kitchen next to fire exit), enclosed residential corridors, driverless cars, overheating of apartments											
Reciprocal structures	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	3D Printed structures	Modular including joints and cavities	Living roofs green, brown and blue	Pod construction	Wayfinding systems	Brick slip systems Plastic tiling on walls	Insulated render systems	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions? What constitutes a cavity in a façade?

												What constitutes a surface Glazing fixity
Curtain walling	Large composite panels; metal/mineral wool/metal	Low carbon concrete unknown fire behaviour	Full building constructed using light steel frame	Irregular profiles for cavity barriers	Pre and post tensioned concrete	Increased range of materials on balconies no longer just concrete Fire spread across balconies More guidance on insulated inset balconies	Electric vehicles = fire risk	Need to accommodate ventilation ducts in façade	Increased use of water mist	Smoke exhaust, smoke control Leakage and actuation of fire dampers and AOVs	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement?	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites? Explosive potential for certain modern fuels and batteries
Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Shared water supplies… suppression on wet mains Can BS 9251 Automatic Fire Suppression Systems (AFSS) be extended to cover other areas?	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Basement plant rooms and suppression Firefighter safety	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Tall buildings/ city living Single stairs Open plan flats What is the maximum length of 'extended corridor' in residential buildings? Single Staircase being extended down to basement	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance? Fire resistance where construction is combustible	Escape over roof	Purpose group review?	Podium design	Definition of common building When is a building too tall and complex?

Product substitution without due consideration - golden thread	Compartment size limits	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	Private lift shafts breaching compartments	Fire-fighting facilities	Multiple, deep, complex-layout basements means of escape and ventilation?	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Hard stop at 18m? What about 17.99m tall?	Resilience in terms of number of Firefighting lifts	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7	Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Design justice Co-designed **by** those affected not designed for them
All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Cavity barriers Test rainscreens and curtain wall constructions Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable? What constitutes a cavity in a façade?	Some old terminology Will we revert to National class standards BS or European Normalised EN for standards? Extended application certificates needed	Cavity barriers and fire stopping The provisions are still misunderstood Hidden fire spread still a threat Does it need its own section B6?	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs Fire spread from rooflight in low-level roof to external wall above	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Backing wall fire resistance Thermal bridging issues?	Compromise of structural lo AD B bearing connections in fire	Disproportionate collapse as result of a fire event	Review of the 0.4m^2 ventilation provisions for ancillary spaces needed	Location of extract and intake for smoke control systems on complex sites Tenability in areas with low ceilings
True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	Future Building Safety Regulatory regime for High Risk Residential Buildings (HRRBs) Buildings <18m should be enforced through independent building control	Misconception Regulation 38 is being enforced	Should BCB's inspect factory or site (or both) for MMCs?	Embodied carbon including rebuild in the event of a fire incident Nominal damage or disproportionate damage caused by a fire event	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30minutes whereas dampers are tested to 60 minutes	***Arrival and set up:*** First responders in danger - Debris field? Should riser diameters be increased to 150mm? Should wet risers trigger at a lower height? Should premises information boxes be mandatory?	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'*	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to BS 8579 needed More guidance on insulated inset balconies needed	Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play Removal of PAS 79 for Residential More guidance needed	Where BR135 and B S8414 routes to compliance are still 'available', the test rig should be constructed using average skill and care The build should not be constructed using 'heightened' skill levels	Test all walls to BS 8414 Do not accept A1 and A2 materials alone as the wall may still fail if not built correctly

					The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	The distance from pump to base of stair is important – not just distance between pump and dry riser inlet	should this be reviewed?	adopted guidance?				
Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Re-wilding movement	Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna be to a building alarm? Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility, and cognitive considerations ?	Access for firefighting complex footprints	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO) Guidance needed House/flat but used as holiday home House/flat but used as Airbnb hotel House/flat but used as apart-hotel	Can Ambulance Service make a rescue using a stretcher? Are lifts suitable to accommodate a stretcher?	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair Residents trusting intuition not authority Residents responding to social media and WhatsApp groups						

Ventilation/ smoke control in modern buildings												
Drivers	Deeper more complicated basements, ageing society, different type of living/different fire loads (such as lithium-ion batteries) sustainability and changes in material preferences, future of fire service resources, changing demographics (age, size, other) change of use throughout life of building, advances in modelling, availability of testing facilities, expectation of occupants on rescue											
Leading to	Different material preferences (non-traditional materials in new applications, new treatments), complicated footprints, different management strategies, more sophisticated numerical method of smoke control strategies, digital asset management, built in alarms, Regulation 38 and golden thread information requirements poorly understood - critical/non-standard data not available, the 'court of public opinion'											
Glulam Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Alternative materials and systems	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put	Guidance on living walls/green walls	3D Printed structures	Modular including joints and cavities	Living and roofs green, brown and blue	Brick slip systems Plastic tiling on walls	Insulated render systems
Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions? What constitutes a cavity in a façade? What constitutes a surface? Glazing fixity	Curtain walling	Smoke exhaust, smoke control Leakage and actuation of fire dampers and AOVs	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites	Evacuation alert systems	Basement plant rooms and suppression Firefighter safety	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Single stairs, open plan flats, mechanical ventilation Single staircases continuing down to basement	Does smoke control work in high/ultra-high buildings? Does mixed bring complications (fire load assumptions/ open plan?)	Definition of common building When is a building too tall and complex and how tall is too tall? When is a dead-end corridor too 'extended'?	Product substitution without due consideration - golden thread

				Explosive potential for certain modern fuels and batteries								
Compartment size limits	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	Fire-fighting facilities	Multiple, deep, complex-layout basements means of escape and ventilation?	Life safety power supplies clear requirements needed	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Review of the 0.4m^2 ventilation provisions for ancillary spaces needed	Misconception Regulation 38 is being enforced	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts
Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play Removal of PAS 79 for Residential More guidance needed	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair											

	Residents trusting intuition not authority Residents responding to social media and WhatsApp groups											
Building with combustible loadbearing units												
Drivers	Sustainability/net zero carbon (materials, structural forms to minimise impact), energy conservation, advanced manufacturing methods, labour availability/skill levels, increased use of robotics, clean growth, low carbon technologies, 'build back better', availability of testing facilities, government policy											
Leading to	Increased use of alternative (non-traditional materials for certain applications) including Cross Laminated Timber (CLT), alternative roof materials, recycled materials, mass timber vilification, material passports, occupant preferences for build forms which address the global challenge of climate change, different fire loads, offsite/modular construction, 'MMC', manufactured-based approach first, fire escape, the 'court of public opinion'											
Glulam Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Alternative materials and systems	Volumetric or panelised	Reciprocal structures	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put Table 10.1 states 'No provisions'	Modular including joints and cavities	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions? What constitutes a cavity in a façade? What constitutes a surface?	Unachievable installation requirements = questions over buildability	Increased range of materials on balconies no longer just concrete Fire spread across balconies More guidance on insulated inset balconies	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement? Leakage and actuation of fire dampers and AOVs
Car park fire loads including deep multi-level car parks	Ancillary spaces	Evacuation alert systems	Buildings with a habitable floor at >18m	Tall buildings/ city living	Should tall residential buildings have	What period of structural fire resistance in	Purpose group review	Specialised housing design review	MMC realistic test regime	Roof covering tests need review	Definition of common building	Product substitution without due

Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes		Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Single stairs Open plan flats What is the maximum length of 'extended corridor' in residential buildings? Single staircase being extended down to basement	more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	high, ultra-high blocks?			Fire resistance where construction is combustible		If structure contributes to fire load, should test procedures be reconsidered?	consideration - golden thread
Compartmentation size limits	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Number and location of adequately sized refuges – with voice communication s that are monitored and effective 24/7	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable?	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a cavity in a façade?	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs Fire spread from rooflight in low-level roof to external wall above	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Backing wall fire resistance Thermal bridging issues?
Compromise of structural lo AD B bearing connections in fire Also, lightweight hangers and gang-nail plates performance in fire	Disproportionat e collapse as result of a fire event	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors	***Fire and Rescue Services Arrival and set up:*** First responders in danger - Debris field? Should riser diameters to be increased to 150mm?	***Arrival and set up continued:*** Should Premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building	Can BS 9251 Automatic Fire Suppression Systems (AFSS) be extended to cover other areas?	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and	Combustible buildings need Automatic fire detection and alarm and Automatic water suppression systems	Performance in fire should be a combination of reaction to fire and fire resistance, not just fire resistance Consider simple ways of achieving this	Where BR135 and BS 8414 routes to compliance are still 'available', the test rig should be constructed using average skill and care The build should not be constructed using	Test all walls to BS 8414 Do not accept A1 and A2 materials alone as the wall may still fail if not built correctly	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair Residents trusting

		AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?	formerly *'disregarded from consideration of boundary separation'* should this be reviewed?		Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?			'heightened' skill levels		intuition not authority Residents responding to social media and WhatsApp groups

Fire load review	
Drivers	Future of mobility, digital first, sustainability/net zero carbon, ageing society, modern construction practices, different shopping habits - move to online (packaged and storage requirements), availability of testing facilities, home ownership
Leading to	Increased use of electric vehicles and scooters, storage of lithium-ion batteries, less control of typical living arrangements, more technology in homes, use of materials (for surfaces, interiors, load and non-load bearing construction) with sustainability credentials, treated or combustible material, IT concealed services and cluster installations, biomass technologies, changes to material specification (post pandemic shortages), the 'court of public opinion', over cladding

Glulam Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Alternative materials and systems	Volumetric or panelised	Reciprocal structures	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	Living roofs green, brown and blue Inverted roofs with paving slabs and gaps between the slabs Fire spread from rooflight in low-level roof	Insulated render systems	Multi use Games Areas (MUGAs)

										to external wall above		
Batteries	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions What constitutes a cavity in a façade? What constitutes a surface?	Curtain walling	Increased range of materials on balconies no longer just concrete Fire spread across balconies	Electric vehicles = fire risk	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement? Leakage and actuation of fire dampers and AOVs	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	Basement plant rooms and suppression Firefighter safety	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Open plan flats What period of structural fire resistance i.e. open plan vs cellular 30 min rooms (furnishings floorings)	Converted dwellings
Purpose group review	Specialised housing design review	Increased home working leading to residential and commercial 'combined' uses Also, consider mixed use in high and very high buildings	MMC realistic test regime Fire resistance where construction is combustible	Fire resistance of roofs (warm, Inverted, green, brown, blue) Roof covering tests need review	Definition of common building If structure contributes to fire load, should test procedures be reconsidered?	Compartment size limits Single stair offices at 30m (to top storey) being proposed	When is a dead-end corridor too 'extended'?	Private lift shafts breaching compartments	Multiple, deep, complex-layout basements means of escape and ventilation?	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Cavity barriers Test rainscreens and curtain wall constructions Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable?
The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6?	The provisions surrounding cavity barriers and fire stopping are still misunderstood	Unitised constructions and gaps between panels - how to resolve on site?	Disproportionate collapse as result of a fire event	Review of the 0.4m^2 ventilation provisions for ancillary spaces needed	***Fire and Rescue Services Arrival and set up:*** Should riser diameters to be increased to 150mm?	***Arrival and set up continued:*** Should premises information boxes be mandatory?	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:***	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to	Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30	Performance in fire should be a combination of reaction to fire and fire resistance, not just fire resistance	Breather membranes of EPDM material can no longer be used How to achieve weathering around

What constitutes a cavity in a façade?	Hidden fire spread still a threat				Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?	A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?	curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	BS 8579 needed More guidance on insulated inset balconies needed	minute construction More definitive guidance needed	Consider simple ways of achieving this	windows and doors?
Where BR135 and BS 8414 routes to compliance are still 'available', the test rig should be constructed using average skill and care The build should not be constructed using 'heightened' skill levels	Mobility scooters and ageing population Charging points inside room in a flat or the internal hall in the flat? Charging points in common corridor(s) Multiple scooters in appointed store? Does this constitute a new 'special fire risk'?	Toys/tools may be stored together in non-fire rated cupboards in domestic properties at present Does such storage constitute an explosive risk? Should 'place of special fire risk' be reviewed?	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement	Biomass boilers	Retail accommodation with flats above Suppression vs separation or both Also, other use at various heights e.g., Co-living (Cinema/ Gymnasium/ Meeting function area/ office hub and more)							

New ways of building - Combustible	
Drivers	Sustainability/net zero carbon, manufactured approach first, use of robotics/AI (Artificial Intelligence, clean growth, 'build back better', energy conservation, Part L/airtightness, fuel poverty, design of deconstruction, availability of testing facilities, government policy
Leading to	Alternative materials and structural forms, replacing traditional materials with recycled/other components ('green concrete', recycled steel, recycled board materials, etc…), Changes to material specification (post pandemic shortages), the 'court of public opinion'

Glulam Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Alternative materials and systems	Volumetric or panelised	Reciprocal structures	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	3D Printed structures	Modular including joints and cavities	Brick slip systems Plastic tiling on walls
Insulated render systems	Tiles, crushed slate and resin binders	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions What constitutes a cavity in a façade? What constitutes a surface? Glazing fixity	Curtain walling	Unachievable installation requirements = questions over buildability	Increased range of materials on balconies no longer just concrete Fire spread across balconies More guidance on insulated inset balconies	Need to accommodate ventilation ducts in façade	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement? Leakage and actuation of fire dampers and AOVs	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites? Explosive potential for certain modern	Evacuation alert systems	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Purpose group review	Specialised housing design review

								fuels and batteries				
MMC realistic test regime Fire resistance where construction is combustible	Fire resistance of roofs (warm, Inverted, green, brown, blue) Roof covering tests need review	Definition of common building If structure contributes to fire load, should test procedures be reconsidered?	Compartment size limits Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	When is a dead-end corridor too 'extended'?	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	Fire-fighting facilities	Multiple, deep, complex-layout basements means of escape and ventilation?	Life safety power supplies clear requirements needed	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Is there a maximum height at which natural smoke ventilation no longer works effectively?
Cavity barriers Test rainscreens and curtain wall constructions Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable?	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a cavity in a façade?	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs Fire spread from rooflight in low-level roof to external wall above	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Disproportionate collapse as result of a fire event	Breach of intumescent paint by fixtures and zone for intumescence	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	***Fire and Rescue Services Arrival and set up:*** First responders in danger - Debris field? Should riser diameters to be increased to 150mm? Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	***Arrival and set up continued:*** Should premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?
Part B vs Part K and the risk posed by using/not	Combustible buildings need	Performance in fire should be a	Breather membranes of	Where BR135 and B S8414	Test all walls to BS 8414							

using laminated glass needs to be reviewed More guidance on balconies to BS 8579 needed More guidance on insulated inset balconies needed	Automatic fire detection and alarm and Automatic water suppression systems	combination of reaction to fire and fire resistance, not just fire resistance Consider simple ways of achieving this	EPDM material can no longer be used How to achieve weathering around windows and doors?	routes to compliance are still 'available', the test rig should be constructed using average skill and care The build should not be constructed using 'heightened' skill levels	Do not accept A1 and A2 materials alone as the wall may still fail if not built correctly							
New ways of building Other												
Drivers	Sustainability/net zero Carbon, modern methods of construction, manufactured approach first, labour availability/skill shortage, conflict of drivers, increased productivity, increased use of robotics, offsite/modular construction), design for deconstruction, fuel poverty, availability of testing facilities, shared car pools, government policy											
Leading to	Alternative material solutions (recycled/reconstituted materials, etc), 3D printing, different structural forms (reciprocal structures, concrete frame, pre-assembled modular, etc) conflicting drivers (sustainability, Part L and fire safety) digital assessment management, changes to material specification (post pandemic shortages), the 'court of public opinion', overheating of apartments											
Alternative materials and systems	Volumetric or panelised	Reciprocal structures	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	3D Printed structures	Modular including joints and cavities	Unitised cladding panels	Pod construction	Brick slip systems Plastic tiling on walls	Re-using of steel containers	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions What constitutes a cavity in a façade? What constitutes a surface? Glazing fixity	Pre-cast concrete
Curtain walling	Glass reinforced	Large composite panels;	Low carbon concrete	Full building constructed	Pre and post tensioned concrete	Unachievable installation requirements =	Entire building pre-cast concrete	Need to accommodate	Roof installed rainwater	Shared water supplies…	Buildings with a habitable floor at >18m	Tall buildings/ city living

	concrete (GRC)	metal/mineral wool/metal	unknown fire behaviour	using light steel frame		questions over buildability		ventilation ducts in façade	attenuation systems	suppression on wet mains	Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Single stairs Open plan flats What is the maximum length of 'extended corridor' in residential buildings? Single staircase being extended down to basement
Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks? Also, purpose group review	Converted dwellings	Podium design	Increased home working leading to residential and commercial 'combined' uses Also, consider mixed use in high and very high buildings	MMC realistic test regime	Car park fire loads Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement? Insulated soffits of ground floor slab … Fire load	Compartment size limits Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Private lift shafts breaching compartments	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Multiple, deep, complex-layout basements means of escape and ventilation?	Hard stop at 18m? What about 17.99m tall
Resilience in terms of number of firefighting lifts	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7	Dignified escape – may include consideration of refuges, communications and access to evacuation lifts	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Cavity barriers Test rainscreens and curtain wall constructions Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable?	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a cavity in a façade?	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat What is a cavity?	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Backing wall fire resistance Thermal bridging issues?	Compromise of structural lo AD B bearing connections in fire Also, lightweight hangers and gang-nail plates performance in fire

									Fire spread from rooflight in low-level roof to external wall above			
Disproportionate collapse as result of a fire event	Fires entering cavities via expansion joints	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	***Fire and Rescue Services Arrival and set up:*** Should riser diameters to be increased to 150mm? Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	***Arrival and set up continued:*** Should premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to BS 8579 needed More guidance on insulated inset balconies needed	Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed	Test all walls to BS 8414 Do not accept A1 and A2 materials alone as the wall may still fail if not built correctly	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement	Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna be to a building alarm? Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility and cognitive considerations ?	Biomass boilers
House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO) Guidance needed House/flat but used as holiday home	Private lift shafts Inspection of private lift shafts	Can Ambulance Service make a rescue using a stretcher? Are lifts suitable to accommodate a stretcher?	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair									

House/flat but used as Airbnb hotel House/flat but used as apart-hotel			Residents trusting intuition not authority Residents responding to social media and WhatsApp groups									
Co-living												
Drivers	Increased demand of city living (urbanisation), Vertical city - many functions in one building, fire services evolution, shared car pools, local government Town Planning policy/initiative(s), more rented properties											
Leading to	Change in management practices, atria and social spaces at height, differing requirements for amenity spaces, different functions (cinema and living, shopping and retirement living), driverless cars, expectation of occupants on rescue											
Atria	Combustible construction and stay put Table 10.1 states 'No provisions'	Multi use Games Areas (MUGAs)	Increased use of water mist	Evacuation alert systems	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks Also, purpose group review	Purpose group review	Increased home working leading to residential and commercial 'combined' uses Also, consider mixed use in high and very high buildings	Definition of common building	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6
Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Design justice Co-designed **by** those affected not designed for them	Dignified escape – may include consideration of refuges, communication and access to evacuation lifts	Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play Removal of PAS 79 for Residential More guidance needed	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement	Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna be to a building alarm ?	Access for firefighting small roads tall buildings and complex footprints	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO) Guidance needed	Retail accommodation with flats above Suppression vs separation or both Also, other use at various heights (Cinema/ Gymnasium/ Meeting	Community in the sky Private lift shafts Inspection of private lift shafts			

					Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility and cognitive considerations ?		House/flat but used as holiday home House/flat but used as Airbnb hotel House/flat but used as apart-hotel	function area/ office hub and more)				
Multiple and different uses												
Drivers	Ageing society, changes in work and living patterns due to COVID-19 (less retail activity in inner cities) building in flexibility from the outset, future of mobility, vertical cities, shared car pools, move less – more convenience, local government Town Planning policy/initiative(s) more rented properties											
Leading to	More care homes, retirement living, assisted living with more technology (living independently for longer) converting building uses (from retail to living) flexible layouts and building in change 'potential', hybrid working, open plan and flexible, need for private amenity spaces, more complex and complicated escape provisions, built in alarms, more technology and IT (concealed services and IT clusters), expectation of occupants on rescue, over cladding											
Atria	Combustible construction and stay put Table 10.1 states 'No provisions'	Electric vehicles = fire risk	Basement plant rooms and suppression Firefighter safety	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks Other communal facilities posing threat to escape routes	Tall buildings and single stairs Open plan flats Different purpose group? Single staircase being extended down to basement	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks Also, purpose group review	Converted dwellings	Purpose group review	Specialised housing design review

Increased home working leading to residential and commercial 'combined' uses	Mix of uses throughout and Mixed use at height/ultra-height?	Definition of common building	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	Compartment size limits Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Fire resistance where construction is combustible	Multiple, deep, complex-layout basements	Life safety and property protection	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	New build HMO guidance needed	Performance in fire should be a combination of reaction to fire and fire resistance, not just fire resistance Consider simple ways of achieving this	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO) Guidance needed House/flat but used as holiday home House/flat but used as Airbnb hotel House/flat but used as apart-hotel
Multi-functional uses: Alternative and flexible												
Drivers	As 'multiple and different uses? Whole life thinking in alignment with the net zero carbon driver, extended service life, design for deconstruction and change of use requirements, shared car pools, move less – more convenience, central government policy, more rented properties											
Leading to	More uses and differing functions at height (office, shopping, living, entertainment, and social spaces), different evacuation and management strategies, need for adapted fire service resources and equipment, driverless cars, shared car pools, over cladding											
Atria	Combustible construction and stay put Table 10.1 states 'No provisions'	3D Printed structures	Multi Use Games Areas (MUGAs)	Evacuation alert systems	Shared water supplies… suppression on wet mains	Oil filled transformer rooms… still relevant as places of special fire hazard?	Ancillary spaces threatening escape routes Stairs continuing down to	Buildings with a habitable floor at >18m Complex shape façades	What about Ambulance Service and person recovery?	Purpose group review	Podium design	Mix of uses throughout and Mixed use at height/ultra-height? Use patterns

						Should there be new definitions of 'places of special fire hazard'?	underground car parks Other communal facilities posing threat to escape routes	Influence of façade shape on fire propagation and large-scale soffits				
Definition of common building	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	Compartment size limits	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Resilience in terms of number of firefighting lifts	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7	Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Design justice Co-designed **by** those affected not designed for them	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	***Fire and Rescue Services Arrival and set up:*** Should riser diameters to be increased to 150mm? Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	***Arrival and set up continued:*** Should premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?
B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly	Fire spread from rooflight in low-level roof to external wall above	New build HMO guidance needed	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to	Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City)	Shared office hubs	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in	Extended service life Meanwhile use	Can Ambulance Service make a rescue using a stretcher? Are lifts suitable to accommodate a stretcher?	

'disregarded from consideration of boundary separation' should this be reviewed?			curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	BS 8579 needed More guidance on insulated inset balconies needed		Removal of PAS 79 for Residential More guidance needed	Re-wilding movement		multiple occupancy (HMO) Guidance needed House/flat but used as holiday home House/flat but used as Airbnb hotel House/flat but used as apart-hotel			
Cavity barriers in modern construction												
Drivers	Advances in manufacturing, manufactured-based approach first, drive to prefabrication, MMC, increased use of robotics, labour availability/ skill levels, increased productivity (speed of construction process, drive to prefabrication), conflicting performance requirements, availability of testing facilities, over cladding											
Leading to	Fire spread characteristics (hidden fire spread risk) risk of disproportionate damage in the event of fire, differing requirements in applicable regulations (Parts A, B, E, F and L)											
Glulam Cross Laminated Timber (CLT) and fire load	Alternative materials and systems	Volumetric or panelised	Reciprocal structures	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Guidance on living walls/green walls	3D Printed structures	Modular including joints and cavities	Living roofs green, brown and blue	Unitised cladding panels	Pod construction	Brick slip systems Plastic tiling on walls
Insulated render systems	Re-using of steel containers	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions	Curtain walling	Large composite panels comprising; metal/mineral wool/metal	Full building constructed using light steel frame	Irregular profiles for cavity barriers	Unachievable installation requirements = questions over buildability	Increased range of materials on balconies no longer just concrete Fire spread across balconies	Need to accommodate ventilation ducts in façade	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation	MMC realistic test regime	Definition of common building

		What constitutes a cavity in a façade? What constitutes a surface Glazing fixity						More guidance on insulated inset balconies		and large-scale soffits		
Product substitution without due consideration - golden thread	Compartment size limits	Testing of cavity barriers where construction is combustible	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Cavity barriers Test rainscreens and curtain wall constructions Test cavity barriers in ultra-tall buildings and does movement at fixings become reasonably foreseeable?	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a cavity in a façade?	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat All openings need cavity barriers (fans and airbricks)	Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof?	More guidance on curtain walls needed More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	Linear gap cavity barriers need test method(s) Are metal trays suitable and available? Cavity barrier guidance at 5.21 is an oddity		

Batteries

Drivers	Modern living, future of mobility (electric cars, scooters, charging technology with proximity to home), shared car pools
Leading	More lithium-ion batteries in the home, storage, and management of fuel sources

Electric vehicles = fire risk	Wall mounted photo voltaics Also, roof mounted photo voltaics	Different types of batteries	Lithium-ion batteries!	Purpose group review	Specialised housing design review	Definition of common building	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement	Compartment size limits Hotels and offices, with top storey at >11m above ground level with single stair	Fire resistance where construction is combustible	Disproportionate collapse as result of a fire event Explosive force of batteries	***Arrival and set up:*** First responders in danger - Debris field? Should riser diameters be	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:***

							car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites? Explosive potential for certain modern fuels and batteries	Single stair offices with a storey at 30m being proposed		Reignition after fire extinguished	increased to 150mm? Should wet risers trigger at lower height(s)? Should statutory undertakers be obligated to deliver water at a consistent pressure for firefighting? Should premises information boxes be mandatory?	A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?
Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed	Mobility scooters and ageing population Charging points inside room in a flat or the internal hall in the flat? Charging points in common corridor(s) Multiple scooters in appointed store? Does this constitute a new 'special fire risk'?	Toys/tools may be stored together in non-fire rated cupboards in domestic properties at present Does such storage constitute an explosive risk? Should 'place of special fire risk' be reviewed?										
Alternative fuels and part L												

Drivers	Sustainability/net zero carbon, energy conversation, regulatory rewards for low carbon technologies (including systems for rainwater attenuation, etc), government policy											
Leading to	Hydrogen, solar, alternative energy systems and distribution, leading to different risks in the home, increased use of biomass, outdated technology over time, aligned technologies such as rainwater attenuation, over cladding, overheating of apartments											
Guidance on living walls/green walls	Living roofs green, brown and blue	Insulated render systems	Air source heat pumps	Hydrogen fuel (known/unknown risks?)	Wall mounted photo-voltaics	Different types of batteries	Purpose group review	Definition of common building	Fire resistance where construction is combustible	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Biomass boilers
Alternative transport: Electric vehicles, scooters etc												
Drivers	Future of mobility, ageing society, electrification, shared car pools, government policy											
Leading to	Increased use electric vehicles, scooters, etc, storage and user requirements, proximity of technology to living functions, driverless cars											
Electric vehicles = fire risk	Batteries	Purpose group review	Specialised housing design review	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites	Compartment size limits	Fire resistance where construction is combustible	***Arrival and set up:*** Should riser diameters be increased to 150mm? Should statutory undertakers be obligated to deliver water at a consistent pressure for firefighting? Should premises information boxes be mandatory?	B4 compliance with Other Residential and Non-residential uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?	Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed	Mobility scooters and ageing population Charging points inside room in a flat or the internal hall in the flat? Charging points in common corridor(s) Multiple scooters in appointed store? Does this constitute a new 'special fire risk'?	Toys/tools may be stored together in non-fire rated cupboards in domestic properties at present Does such storage constitute an explosive risk? Should 'place of special fire risk' be reviewed?	

				Explosive potential for certain modern fuels and batteries								
Provisions for different occupant abilities												
Drivers	Ageing society, city living and vertical cities (many functions in one building) future of population (age, size/bariatrics) complex footprints, single stair, digital innovations, government policy, more rented properties											
Leading to	Non-homogenous occupant profiles, fire escape provisions, complex footprints and development for fire and rescue strategies, alternative management strategies using digital means, expectation of occupants on rescue; the 'court of public opinion'											
Atria	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	Living façades and roofs	Wayfinding systems	Evacuation alert systems	Do some disabilities mean pre movement time and movement time would make living in an open plan flat inappropriate? When is a dead-end corridor too extended for disabled people? When is a building too tall?	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks Also, purpose group review	Escape over roof	Converted dwellings	Specialised housing design review
Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Mix of uses throughout and Mixed use at height/ultra-height?	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	Private lift shafts breaching compartments	Multiple, deep, complex-layout basements means of escape and ventilation?	Life safety power supplies clear requirements needed	Fire-fighting facilities Design to the limits of the Fire and Rescue Services' abilities or to well within their capabilities?	Resilience in terms of number of firefighting lifts	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7	Dignified escape Includes number and size of refuges or other provisions	Design justice Co-designed **by** those affected not designed for them	Flashing beacons	PEEPS and no specific guidance paragraphs in AD B for disabled people
Are staff available and properly trained (… many different medical conditions will need to be understood by those undertaking rescues) to	Personal Emergency Evacuation Plans (PEEPS) and the role Building	Mobility scooters and ageing population	Toys/tools may be stored together in non-fire rated cupboards in domestic	Community (function) spaces terraces	Penthouse construction Prevalence of rooftop pools and saunas	Firefighting rescues in Specialised housing	In residential buildings with 'stay put' policy in place, those residents without a					

lift disabled people into an evacuation chair and, if so, is this 'undignified' or 'dignified'? Dignified escape also role of PEEPS within flats	Management must play Removal of PAS 79 for Residential More guidance needed	Charging points inside room in a flat or the internal hall in the flat? Charging points in common corridor(s) Multiple scooters in appointed store? Does this constitute a new 'special fire risk'?	properties at present Does such storage constitute an explosive risk? Should 'place of special fire risk' be reviewed?	Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement	How responsive will a resident using a rooftop pool or sauna be to a building alarm Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility and cognitive considerations ?	Dignified rescue Appropriately sized refuges Equipment in care homes to facilitate evacuation Management role and evacuation strategies	mobility disability and not immediately affected by a fire can exercise choice to self-evacuate even though the policy is 'stay put' Disabled people are not free to make the same choice					
Escape and evacuation strategies												
Drivers	Ageing society, city living and vertical cities (many functions in one building) future of population (age, size/bariatrics) complex footprints, single stair, digital innovations, government policy, more rented properties, move less – more convenience, home ownership, more rented properties											
Leading to	Non-homogenous occupant profiles, fire escape provisions, complex footprints and development for fire and rescue strategies, alternative management strategies using digital means, expectation of occupants on rescue; the 'court of public opinion'											
Atria	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	Living roofs green, brown and blue	Wayfinding systems	Insulated render systems	Battery powered detectors	Increased use of water mist	Evacuation alert systems	Ancillary spaces threatening escape routes Stairs continuing down to underground car parks	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a	Bariatric occupants and evacuation	What period of structural fire resistance in high, ultra-high blocks? Also, purpose group review

									Other communal facilities posing threat to escape routes	reasonable 'walk down'? What is reasonable to walk down?		
Escape over roof	Specialised housing design review	Mix of uses throughout and Mixed use at height/ ultra-height?	MMC realistic test regime	Fire resistance where construction is combustible	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	Fire detection and alarm review needed application and scope of BS 5839 Parts 1 and 6	When is a dead-end corridor too extended? When is a building too tall?	Private lift shafts breaching compartments	Multiple, deep, complex-layout basements means of escape and ventilation?	Life safety power supplies clear requirements needed	Fire-fighting facilities Design to the limits of the Fire and Rescue Services' abilities or to well within their capabilities?	Resilience in terms of number of firefighting lifts
Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Design justice Co-designed **by** those affected not designed for them	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	***Risers:*** Should smoke seals be provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	Smoke exhaust, smoke control Leakage and actuation of fire dampers and AOVs	Dignified escape	Personal Emergency Evacuation Plans (PEEPS) and the role Building Management must play Removal of PAS 79 for Residential More guidance needed	Three-storey (or taller) dwellings being formed with open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed	Performance in fire should be a combination of reaction to fire and fire resistance, not just fire resistance Consider simple ways of achieving this	Community (function) spaces terraces Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement	Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna be to a building alarm? Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door? Sight, hearing, mobility and cognitive considerations ?	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair Residents trusting intuition not authority Residents responding to social media and WhatsApp groups	

Part B5 review												
Drivers	Societal changes as per most of the above											
Leading to	As per most of the above											
Glulam Cross Laminated Timber (CLT) and fire load	Combustible construction compartment size	Reciprocal structures	Atria	New systems/material: Structural Insulated Panels (SIPs), tensile membranes, glass reinforced material and others	Wind-driven fire combustible construction	Combustible construction and stay put Table 10.1 states 'No provisions'	Guidance on living walls/green walls	Living roofs green, brown and blue	Wayfinding systems	Insulated render systems	Tiles, crushed slate and resin binders	Pre and post tensioned concrete
Wall mounted photo voltaic panels Roof mounted photo voltaic panels	Different types of batteries Offensive Vs defensive firefighting tactics?	Increased use of water mist	Evacuation alert systems	Basement plant rooms and suppression Firefighter safety	Shared water supplies… suppression on wet mains Can BS 9251 Automatic Fire Suppression Systems (AFSS) be extended to cover other areas?	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Smoke ventilation systems Deep multi-level basement car parks Dead spots and need for impulse fan guidance Downstand beams and presence of services may affect smoke movement? Leakage and actuation of fire dampers and AOVs	Car park fire loads including deep multi-level car parks Insulated soffits of ground floor slab … adding to basement car park fire loads Modern cars and their fire loads What the resultant fire load might be with car stackers being used – particularly congested (complex footprint) sites Explosive potential for certain modern fuels and batteries	Buildings with a habitable floor at >18m Complex shape façades Influence of façade shape on fire propagation and large-scale soffits	Tall buildings/ city living Single stairs Open plan flats What is the maximum length of 'extended corridor' in residential buildings, particularly very tall buildings ? Single staircase being extended down to basement	Should tall residential buildings have more than one stair? Is a building with 20 (or 40 or 60 or more) flights a reasonable 'walk down'? What is reasonable to walk down?	Bariatric occupants and evacuation

What period of structural fire resistance in high, ultra-high blocks? Also, purpose group review	Purpose group review	Podium design	Specialised housing design review	Mix of uses throughout and Mixed use at height/ultra-height?	MMC realistic test regime Fire resistance where construction is combustible	Definition of common building When is a building too tall?	Product substitution without due consideration-golden thread	Compartment size limits Large warehouses	Hotels and offices, with top storey at >11m above ground level with single stair Single stair offices with a storey at 30m being proposed	When is a dead-end corridor too extended for safe firefighting and rescue?	Private lift shafts breaching compartments	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?
Multiple, deep, complex-layout basements means of escape and ventilation?	Life safety power supplies clear requirements needed	Hard stop at 18m? What about 17.99m tall?	Resilience in terms of number of firefighting lifts	Consistency of provision, signage and firefighting panel design	Number and location of adequately sized refuges – with voice communications that are monitored and effective 24/7	Dignified escape – may include consideration of refuges, communications, and access to evacuation lifts	Personal Emergency Evacuation Plans (PEEPS) No specific guidance paragraphs in AD B for disabled Where is PEEPS going for residential blocks?	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Cavity barriers Test rainscreens and curtain wall cavity barrier tests Test cavity barriers in ultra-tall buildings Does movement at fixings become reasonably foreseeable?	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a cavity in a façade?	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat
Unitised constructions and gaps between panels - how to resolve on site?	Roof and wall junction detail review needed What is the status of parapets – external wall or roof? Roof covering tests need review Inverted roofs with paving slabs and gaps between the slabs Fire spread from rooflight in low-level roof to external wall above	Is there a maximum height at which natural smoke ventilation no longer works effectively?	Compromise of structural lo AD B bearing connections in fire Also, lightweight hangers and gang-nail plates performance in fire	Disproportionate collapse as result of a fire event Explosive force of batteries Reignition after fire extinguished	Life safety and property protection	Toxicity	Water conservation	Non-standard equipment	Firefighter access relative to fire location How far to travel internally to the stair? Transfer corridors… how intuitive are they and how appropriate are they for firefighters having to carry kit? How far is too far?	Hydrants should be provided irrespective of the 280m^2 rule	Should combustibility of building materials be a factor in determining firefighting access and facilities rather than hose length and vehicle reversing distance?	Review of the 0.4m^2 ventilation provisions for ancillary spaces needed
True impact of very large fires Harm to the environment	***Risers:*** Should smoke seals be	***FSO and Reg 4(3) and B5:***	***Fire and Rescue Services***	***Arrival and set up continued:***	B4 compliance with Other Residential and Non-residential	New build HMO guidance needed	More guidance on curtain walls needed	Three-storey (or taller) dwellings being formed with	Performance in fire should be a combination of reaction to fire	Mobility scooters and ageing population	Toys/tools may be stored together in non-fire rated	Community (function) spaces terraces

Consider CO_2 costs associated with the clean-up and re-build	provided on doors to riser ducts? Very tall risers and smoke spread? ***Smoke shafts:*** Extended corridors AOV doors only 30 minutes whereas dampers are tested to 60 minutes The vent actuator (if using door blanks) needs fire testing Clarify Diagram 3.7 with respect to ventilated lobby requirements Is Diagram 3.9b still suitable for open plan flats?	FSO seeks continual improvement whilst regulation 4(3) of the Building regulations seeks 'no worsening' All of B5 needs review	***Arrival and set up:*** First responders in danger- Debris field? Should riser diameters to be increased to 150mm? Should wet risers to trigger at lower height(s)? Should Statutory undertakers be obligated to deliver water at a consistent pressure for firefighting?	Should premises information boxes be mandatory? The distance from pump to base of stair is important, not just the distance between pump and dry riser inlet Scotland considering two stairs in any building with a habitable storey at >18m above ground level Should designs incorporate a fire break floor every 10th floor level? Should stairs be pressurised?	uses which are high rise ***Unprotected areas:*** A new building may pose a threat to part of another building formerly *'disregarded from consideration of boundary separation'* should this be reviewed?		More guidance on spandrel panels needed Glazing and grillage fixing in curtain walls needed Should Centre for Window and Cladding Technology (CWCT) Technical guidance note 98 be considered as adopted guidance?	open plan ground floor layouts Kitchens not enclosed in 30 minute construction More definitive guidance needed	and fire resistance, not just fire resistance Consider simple ways of achieving this	Charging points inside room in a flat or the internal hall in the flat? Charging points in common corridor(s) Multiple scooters in appointed store? Does this constitute a new 'special fire risk'?	cupboards in domestic properties at present Does such storage constitute an explosive risk? Should 'place of special fire risk' be reviewed?	Artificial plants and pergolas (Greening of the City) Plastic tiling Re-wilding movement
Penthouse construction Prevalence of rooftop pools and saunas How responsive will a resident using a rooftop pool or sauna be to a building alarm Play areas impact on behaviours Should there be limitations on travel distances from the furthest pool or sauna on furthest terrace to the penthouse flat's front door?	Biomass boilers	Access for firefighting small roads tall or complex footprint buildings	House/flat converted so as to accommodate both flats and people living in multiple occupancy units i.e., Houses in multiple occupancy (HMO) Guidance needed House/flat but used as holiday home	Residents ignoring stay put Residents self-evacuating down single stair as Fire and Rescue Service ascending the stair Residents trusting intuition not authority Residents responding to social media	Physiological effect of fire fighting in very tall buildings? Assumptions regarding low occupancy during day may no longer be valid (Home working-pandemic) Firefighter welfare	Firefighting rescues in Specialised housing Appropriately sized refuges Equipment in care homes to facilitate evacuation Management role and evacuation strategies	Was student accommodation ever envisaged to be high rise	How much reliance placed on 'highly managed' buildings?				

Sight, hearing, mobility and cognitive considerations?			House/flat but used as Airbnb hotel House/flat but used as apart-hotel	and WhatsApp groups								
Competing regimes												
Drivers	Sustainability and net zero carbon by 2050, regulating industry practices through building regulations, interacting and overlapping requirements for products in built environments, international pressure on UK delivery for example impact/opportunities of BREXIT, government policy, home ownership, more rented properties											
Leading to	Different expectations on products - not always aligned and possible in one function, requires 'choice' by client/specifier, the 'court of public opinion'											
Glulam Cross Laminated Timber (CLT) and fire load	Guidance on living walls/green walls	3D Printed structures	Living roofs green, brown and blue	Tiles, crushed slate and resin binders	Should open state cavity barriers be tested differently to be appropriate for end use in rainscreens and curtain wall constructions? What constitutes a surface? Glazing fixity	Curtain walling	Low carbon concrete unknown fire behaviour	Full building constructed using light steel frame	Air source heat pumps	Wall mounted photo voltaics Also, roof mounted photo voltaics	Different types of batteries	Need to accommodate ventilation ducts in façade
Fire resistance of roofs (warm, Inverted, green, brown, blue) Roof covering tests need review	Product substitution without due consideration-golden thread	Fire resistance where construction is combustible	The guidance on cavity barriers in AD B is no longer suitable for modern constructions as to be inappropriate Does it need its own section… B6? What constitutes a	The provisions surrounding cavity barriers and fire stopping are still misunderstood Hidden fire spread still a threat	Unitised constructions and gaps between panels - how to resolve on site?	Backing wall fire resistance Thermal bridging issues?	Compromise of structural lo AD B bearing connections in fire Also, lightweight hangers and gang-nail plates performance in fire	Water conservation	Basement car parks and Insulated soffits of ground floor slab … Fire load	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	Part B vs Part K and the risk posed by using/not using laminated glass needs to be reviewed More guidance on balconies to BS 8579 needed More guidance on insulated inset balconies needed	Breather membranes of EPDM material can no longer be used How to achieve weathering around windows and doors?

			cavity in a façade?									
Biomass boilers	Extended service life 'Meanwhile' use											
Large industrial												
Drivers	COVID-19, changed shopping habits (moving online and delivery), technology advances, robotics and AI (Artificial Intelligence), advanced manufacturing such as 3D, increased use of plastics and alternative materials, move less – more convenience											
Leading to	Increased requirement for storage before delivery, more battery-operated devices, modern materials and assembly techniques more plastics, future of firefighting provisions and concepts											
Wayfinding systems	Large composite panels; metal/mineral wool/metal	Full building constructed using light steel frame	Roof installed rainwater attenuation systems	Oil filled transformer rooms… still relevant as places of special fire hazard? Should there be new definitions of 'places of special fire hazard'?	Definition of common building	Compartment size limits Large/ultra large warehouses Total loss of asset	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	Life safety and property protection	Toxicity	Water conservation	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	Buildings <18m should be enforced through independent building control
Misconception Regulation 38 is being enforced	Physiological effect of fire fighting in very large buildings? Firefighter welfare	Robotics Deep-seated fires										
Checking compliance in different ways (digital, AI)												
Drivers	Digital innovation, skill shortage and labour availability, building safety focus, central government policy, devolved administration policies											

Leading to	Digital asset management, IT service clusters, future of fire services, the 'court of public opinion'											
Reciprocal structures	3D Printed structures	Pod construction	Ensuring high quality construction	External fire spread under BS or BS EN or other	Lack of adequate test information for new products in end use systems Lack of extended applications and fields of application stipulations	Old terminology	Should there be height limitations, even where and external walling 'system' meets the performance requirements of BR135?	Unachievable installation requirements = questions over buildability	Wall mounted photo voltaics Roof mounted photo voltaics	Materials in combination Declaration of Performance and compatibility with '*systems* and Red Book compliance	Product substitution without due consideration - golden thread	Fire-fighting facilities Design to the limits of the Fire and Rescue Services' abilities or to well within their capabilities?
Hard stop at 18m? What about 17.99m tall	Consistency of provision, signage, and firefighter panel design	All forms of modelling need review (inputs and variables) Is data robust? Sophisticated applications confidence?	Misuse of Smoke Control Association guidance Stepping outside the guide needs to be validated in some way?	Digital approval process	Life safety and property protection	Toxicity	Why design for Fire and Rescue Service to operate at the very limit of their operational effectiveness?	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build	Future Regulatory regime for High Risk Residential Buildings (HRRBs) Buildings <18m should be enforced through independent building control	Misconception Regulation 38 is being enforced	Should BCB's inspect factory or site (or both) for MMCs?	True impact of very large fires Harm to the environment Consider CO_2 costs associated with the clean-up and re-build
LABC and AI's competing Does competition lead to effective enforcement of Building Regs? Dual regime can lead to differing standards with respect to all buildings, irrespective of height	Checking compliance on very old buildings	Access to guidance to be free If designer cannot afford access to BSI online platforms, how can they access the information referred to in AD B?	New build HMO guidance needed	When is a roof a floor? Fire resistance of portal frame buildings? Is the 60-person rule valid? Open spatial rule of 4.5m? Smoke detection references? Lighting diffuser guidance out of date? Notional boundaries and unified ownership?	Fires external to the building?	BB100 or BS 9999 Sprinklers and travel distances *Linked comment…* BB100 Respondent believed children's lungs are susceptible to lung function damage if they were to be exposed to smoke The respondent asks for review of sprinkler requirement	Can Ambulance Service make a rescue using a stretcher? Are lifts suitable to accommodate a stretcher?	Access to neighbouring land Ability to inspect 'key features' relating to fire safety in another person's demise?				

				Are healthcare premises assembly or HTM? Electrical sockets guidance needed? Rainwater attenuation? Parcel delivery (increased fire load)? Fire curtains and their role in providing compartmentation?								

Appendix B Survey questions

Section 1

Organisation

Which of the following best describes the role of your organisation? - Selected Choice or - Other - Text

Please tell us about your organisation and the innovative/modern construction technology, design methodology and/or building usage approach you have specialist knowledge of. Lastly, please tell us about the principal market/industry sectors/building types these comments apply to (e.g. low-rise housing, high-rise housing, offices etc).

In addition to this survey, we would like to provide a selection of respondents with the opportunity to give more detailed feedback on Approved Document B via a short 20-minute telephone interview. If you would be happy to be contacted for a 20-minute interview, please indicate your consent by ticking the box below. - I am happy to be contacted to take part in a telephone interview

Section 1

Volume 1 - Introduction (including scope and application)

Please indicate which parts of the introduction present you with challenges in undertaking your work.

- The Approved Documents: What is an approved document, How to use this approved document, User requirements, Where you can get further help
- The Building Regulations
- Section 0 Approved Document B Fire Safety Dwellings: Summary, Arrangement of sections, Management of premises, Property protection, Inclusive design, Alternative approaches, Purpose groups, Mixed use buildings.

Please provide a brief description of the issue(s) you routinely face.

Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - B1 Means of Warning and Escape

Please indicate which parts of B1 present you with challenges in undertaking your work.

- Intention
- Section 1 Fire Detection and Alarm Systems: General provisions, Large dwellinghouses, Extensions and material alterations, Blocks of flats, Student accommodation, Sheltered housing, Design and installation of systems
- Section 2 Means of Escape - Dwellinghouses: Escape from the ground storey, Escape from upper storeys a maximum of 4.5m above ground level, Escape from upper storeys more than 4.5m above ground level, General provisions, Work on existing dwellinghouses

- Section 3 Means of Escape - Flats: Introduction, General provisions, Flats with upper storeys a maximum of 4.5m above ground level, Flats with upper storeys more than 4.5m above ground level, Means of escape in the common parts of the flat, Common stairs, Doors on escape routes, Lifts, Final exits

Please provide a brief description of the issue(s) you routinely face.

Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - B2 Internal Fire Spread (linings)

Please indicate which parts of B2 present you with challenges in undertaking your work.

- Intention
- Section 4 Wall and Ceiling Linings: Classification of linings, Thermoplastic materials

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - B3 Internal Fire Spread (structure)

Please indicate which parts of B3 present you with challenges in undertaking your work.

- Intention
- Section 5 Internal Fire Spread - Dwellinghouses: Loadbearing elements of structure, Compartmentation, Cavities
- Section 6 Loadbearing Elements of the Structure: Fire resistance standard, conversion to flats Volume 1 - B3 Internal Fire Spread (structure)
- Section 7 Compartmentation/Sprinklers - Flats: Provision of compartmentation, Sprinklers, Construction of compartment walls and compartment floors, Openings in compartmentation, Protected shafts
- Section 8 Cavities - Flats: Provision of cavity barriers, Pathways around fire-separating elements, Construction and fixings for cavity barriers
- Section 9 Protection of Openings and Fire-stopping: Introduction, Openings for pipes, Mechanical ventilation and air-conditioning systems, Flues, etc., Fire-stopping

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - B4 External Fire Spread

Please indicate which parts of B4 present you with challenges in undertaking your work.

- Intention
- Section 10 Resisting Fire Spread Over External Walls: Introduction, Combustibility of external walls, Regulation 7(2) and requirement B4
- Section 11 Resisting Fire Spread From One Building to Another: Introduction, Boundaries, Unprotected areas and fire resistance, Methods for calculating acceptable unprotected area
- Section 12 Resisting Fire Spread Over Roof Coverings: Introduction, Separation distances

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - B5 Access and Facilities for the Fire Service

Please indicate which parts of B5 present you with challenges in undertaking your work.

- Intention
- Section 13 Vehicle Access: Provision and design of access routes and hardstandings, Blocks of flats fitted with fire mains
- Section 14 Fire Mains and Hydrants - Flats: Introduction, Provision of fire mains, Design and construction of fire mains, Provision of private hydrants
- Section 15 Access to Buildings for Firefighting Personnel - Flats: Provision of firefighting shafts, Design and construction of firefighting shafts, Rolling shutters in compartment walls, Wayfinding signage for the fire service
- Section 16 Venting of Heat and Smoke from Basements - Flats: Provision of smoke outlets, Construction of outlet ducts or shafts

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 - Regulation 38 Fire Safety Information

Please indicate which parts of Regulation 38 present you with challenges in undertaking your work.

- Intention
- Section 17 Fire Safety Information: Essential information, Additional information for complex buildings

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 1 – Appendices

Comments Appendix A

Comments Appendix B

Please indicate which parts of the Appendices present you with challenges in undertaking your work.

- Appendix B - Performance of Materials, Products and Structures: Introduction, Reaction to fire, National classifications for reaction to fire, Thermoplastic materials, Roofs, Fire resistance, Application of the fire resistance standards in Table B4
- Appendix C - Fire Doorsets
- Appendix D – Methods of Measurement: Occupant number, Travel distance, Width, Building dimensions, Free area of smoke ventilators
- Appendix E - Sprinklers: Sprinkler systems, Design of sprinkler systems, Water supplies and pumps
- Appendix F - Standards Referred To: European Standards, British Standards Appendix G

Comments Appendix G

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - Introduction (including scope and application)

Please indicate which parts of the introduction present you with challenges in undertaking your work.

- The Building Regulations
- Section 0 Approved Document B Fire Safety Dwellings: Summary, Arrangement of sections, Management of premises, Property protection, Inclusive design, Alternative approaches, Purpose groups, Mixed use buildings

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - B1 Means of Warning and Escape

Please indicate which parts of B1 present you with challenges in undertaking your work.

- Intention
- Section 1 Fire Detection and Alarm Systems: General provisions, Fire detection and alarm systems, Design and installation of systems
- Section 2 Design for Horizontal Escape: Introduction, Escape route design, Residential care home

- Section 3 Design for Vertical Escape: Introduction, Number of escape stairs, Provision of refuges, Width of escape stairs, Design and protection of escape stairs
- Section 4 Small Premises: Construction, Travel distance and number of escape routes, Escape stairs in small premises
- Section 5 General Provisions: Introduction, Protection of escape routes, Doors on escape routes, General provisions, Lifts, Refuse chutes and storage, Shop store rooms

Please provide a brief description of the issue(s) you routinely face.

Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - B2 Internal Fire Spread (linings)

Please indicate which parts of B2 present you with challenges in undertaking your work.

- Intention
- Section 6 Wall and Ceiling Linings: Classification of linings, Thermoplastic materials

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - B3 Internal Fire Spread (structure)

Please indicate which parts of B3 present you with challenges in undertaking your work.

- Intention
- Section 7 Loadbearing Elements of the Structure: Fire resistance standard, raised storage areas
- Section 8 Compartmentation/Sprinklers: Provision of compartmentation, Sprinklers, Construction of compartment walls and compartment floors, Openings in compartmentation, Protected shafts
- Section 9 Cavities: Provision of cavity barriers, Pathways around fire-separating elements, Extensive cavities, Construction and fixings for cavity barriers
- Section 10 Protection of Openings and Fire-stopping: Introduction, Openings for pipes, Mechanical ventilation and air-conditioning systems, Flues, etc., Fire-stopping
- Section 11 Special Provisions for Car Parks

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - B4 External Fire Spread

Please indicate which parts of B4 present you with challenges in undertaking your work.

- Intention
- Section 12 Resisting Fire Spread Over External Walls: Introduction, Combustibility of external walls, Regulation 7(2) and requirement B4
- Section 13 Resisting Fire Spread from One Building to Another: Introduction, Boundaries, Unprotected areas and fire resistance, Methods for calculating acceptable unprotected area
- Section 14 Resisting Fire Spread Over Roof Coverings: Introduction, Separation distances

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - B5 Access and Facilities for the Fire Service

Please indicate which parts of B5 present you with challenges in undertaking your work

- Intention
- Section 15 Vehicle Access: Buildings not fitted with fire mains, Buildings fitted with fire mains, Design of access routes and hardstandings
- Section 16 Fire Mains and Hydrants: Introduction, Provision of fire mains, Design and construction of fire mains, Provision of private hydrants
- Section 17 Access to Buildings for Firefighting Personnel: Introduction, Provision of firefighting shafts, Design and construction of firefighting shafts, Rolling shutters in compartment walls
- Section 18 Venting of Heat and Smoke from Basements: Provision of smoke outlets, Construction of outlet ducts or shafts, Basement car parks

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - Regulation 38 Fire Safety Information

Please indicate which parts of Regulation 38 present you with challenges in undertaking your work.

- Intention
- Section 19 Fire Safety Information: Essential information, Additional information for complex building

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Volume 2 - Appendices

Please indicate which parts of the Appendices present you with challenges in undertaking your work.

- Appendix A - Key Terms
- Appendix B - Performance of Materials, Products and Structures: Introduction, Reaction to fire, National classifications for reaction to fire, Thermoplastic materials, Roofs, Fire resistance, Application of the fire resistance standards in Table B4
- Appendix C - Fire Doorsets
- Appendix D - Methods of Measurement: Occupant number, Travel distance, Width, Building dimensions, Free area of smoke ventilators
- Appendix E - Sprinklers: Sprinkler systems, Design of sprinkler systems, Water supplies and pumps
- Appendix F - Standards Referred To: European Standards, British Standards
- Appendix G - Documents Referred To: Legislation, Other documents

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Please provide a brief description of the issue(s) you routinely face.

Please describe the reason(s) (such as AD B guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

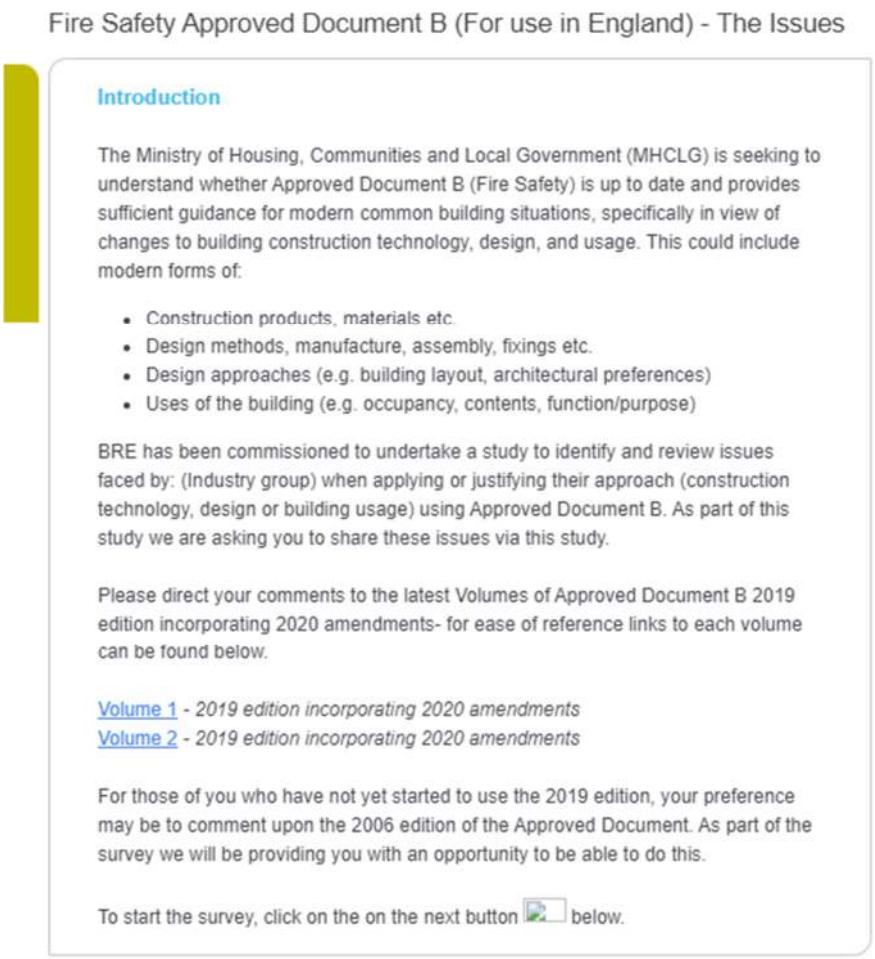
If you are not familiar with the new 2019 edition incorporating 2020 amendments (either Volume 1 or Volume 2) but would like to comment on issues arising from use of the 2006 version (as amended), please do so in the box below.

Please state the section, the volume and edition of Approved Document B you wish to comment on. Please describe the reason(s) (such as guidance was outdated, unclear, flawed, etc.) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

If you would like to suggest additional or alternative approaches to some part(s) of AD B guidance e.g. if you believe an industry technical paper, guide or research report would provide equivalent and clearer practical guidance, please provide details.

Alternatively, if you believe another National Standard would provide equivalent and clearer practical guidance, please provide details. Finally...

The full survey screenshots are presented as follows.



Fire Safety Approved Document B (For use in England) - The Issues

Introduction

The Ministry of Housing, Communities and Local Government (MHCLG) is seeking to understand whether Approved Document B (Fire Safety) is up to date and provides sufficient guidance for modern common building situations, specifically in view of changes to building construction technology, design, and usage. This could include modern forms of:

- Construction products, materials etc.
- Design methods, manufacture, assembly, fixings etc.
- Design approaches (e.g. building layout, architectural preferences)
- Uses of the building (e.g. occupancy, contents, function/purpose)

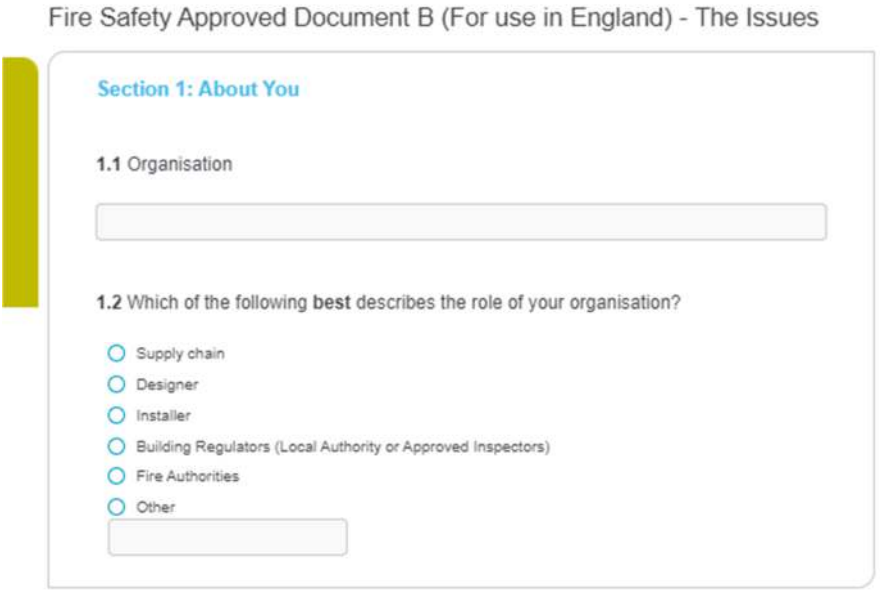
BRE has been commissioned to undertake a study to identify and review issues faced by: (Industry group) when applying or justifying their approach (construction technology, design or building usage) using Approved Document B. As part of this study we are asking you to share these issues via this study.

Please direct your comments to the latest Volumes of Approved Document B 2019 edition incorporating 2020 amendments- for ease of reference links to each volume can be found below.

Volume 1 - *2019 edition incorporating 2020 amendments*
Volume 2 - *2019 edition incorporating 2020 amendments*

For those of you who have not yet started to use the 2019 edition, your preference may be to comment upon the 2006 edition of the Approved Document. As part of the survey we will be providing you with an opportunity to be able to do this.

To start the survey, click on the on the next button below.

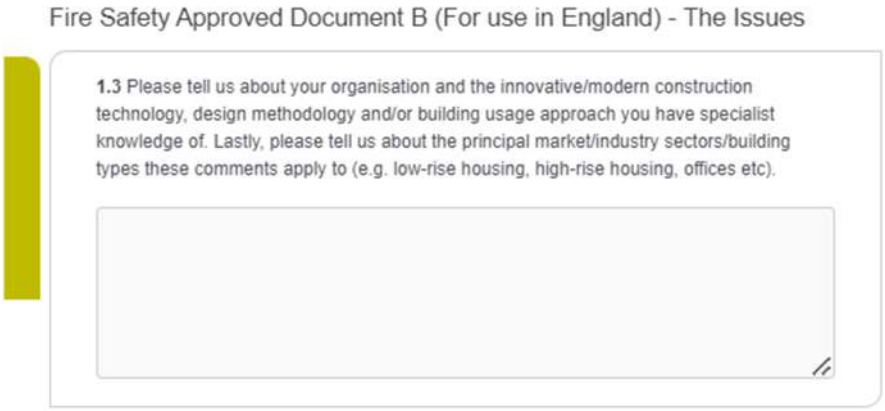

Fire Safety Approved Document B (For use in England) - The Issues

Section 1: About You

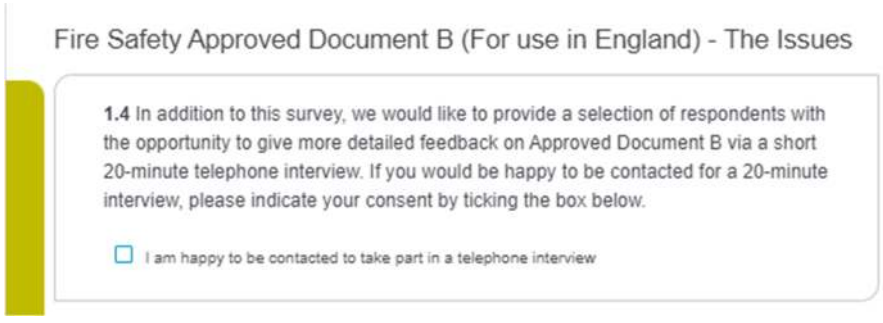
1.1 Organisation

1.2 Which of the following **best** describes the role of your organisation?

- Supply chain
- Designer
- Installer
- Building Regulators (Local Authority or Approved Inspectors)
- Fire Authorities
- Other


Fire Safety Approved Document B (For use in England) - The Issues

1.3 Please tell us about your organisation and the innovative/modern construction technology, design methodology and/or building usage approach you have specialist knowledge of. Lastly, please tell us about the principal market/industry sectors/building types these comments apply to (e.g. low-rise housing, high-rise housing, offices etc).


Fire Safety Approved Document B (For use in England) - The Issues

1.4 In addition to this survey, we would like to provide a selection of respondents with the opportunity to give more detailed feedback on Approved Document B via a short 20-minute telephone interview. If you would be happy to be contacted for a 20-minute interview, please indicate your consent by ticking the box below.

- ☐ I am happy to be contacted to take part in a telephone interview

Fire Safety Approved Document B (For use in England) - The Issues

Section 2: Approved Document B

Please answer Section 2 **specifically** with regard to the innovative and/or modern method of construction, material, design or use that you have specialist knowledge of.

2.1 Which parts of the approved document do you wish comment on?

- ○ Volume 1: Dwellings
- ○ Volume 2: Buildings other than dwellings
- ○ Volume 1 and Volume 2
- ○ I don't know / can't remember the volume or section
- ○ I am not familiar with the 2019 edition

Fire Safety Approved Document B (For use in England) - The Issues

2.2 Which of the requirements from Volume 1 and Volume 2 of Approved Document B do you wish to comment on? (*Mark all that apply*)

	Volume 1: Dwellings	Volume 2: Buildings other than dwellings
Introduction (including scope of application)	☐	☐
B1: Means of warning and escape	☐	☐
B2: Internal fire spread (linings)	☐	☐
B3: Internal fire spread (structure)	☐	☐
B4: External fire spread	☐	☐
B5: Access and facilities for the fire service	☐	☐
Regulation 38	☐	☐
Appendices	☐	☐

Fire Safety Approved Document B (For use in England) - The Issues

Instructions for completing the free text boxes in the remainder of the survey.

The free text boxes will not accept cut and pasted images. Please send any diagrams or drawings you would like to reference to fi@bre.co.uk. Please include in the email your name, organisation and whether you are a; supply chain provider, designer, installer, building regulator, fire authority, (other) to help us marry your 'attachments' to your survey comments.

If commenting on more than one section in any Part of Volume 1 (or Volume 2) please create your own headings in the free text box provided.

There is no limit on the number of characters free text boxes will accept.

Fire Safety Approved Document B (For use in England) - The Issues

Volume 1 - Introduction (including scope and application)
Please indicate which parts of the introduction present you with challenges in undertaking your work.

- ☐ **The Approved Documents:** What is an approved document, How to use this approved document, User requirements, Where you can get further help
- ☐ **The Building Regulations**
- ☐ **Section 0 Approved Document B Fire Safety Dwellings:** Summary, Arrangement of sections, Management of premises, Property protection, Inclusive design, Alternative approaches, Purpose groups, Mixed use buildings

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 1 - B1 Means of Warning and Escape
Please indicate which parts of B1 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 1 Fire Detection and Alarm Systems:** General provisions, Large dwellinghouses, Extensions and material alterations, Blocks of flats, Student accommodation, Sheltered housing, Design and installation of systems
- ☐ **Section 2 Means of Escape - Dwellinghouses:** Escape from the ground storey, Escape from upper storeys a maximum of 4.5m above ground level, Escape from upper storeys more than 4.5m above ground level, General provisions, Work on existing dwellinghouses
- ☐ **Section 3 Means of Escape - Flats:** Introduction, General provisions, Flats with upper storeys a maximum of 4.5m above ground level, Flats with upper storeys more than 4.5m above ground level, Means of escape in the common parts of the flat, Common stairs, Doors on escape routes, Lifts, Final exits

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 1 - B2 Internal Fire Spread (linings)

Please indicate which parts of B2 present you with challenges in undertaking your work.

- ☐ **Intention:**
- ☐ **Section 4 Wall and Ceiling Linings:** Classification of linings, Thermoplastic materials

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

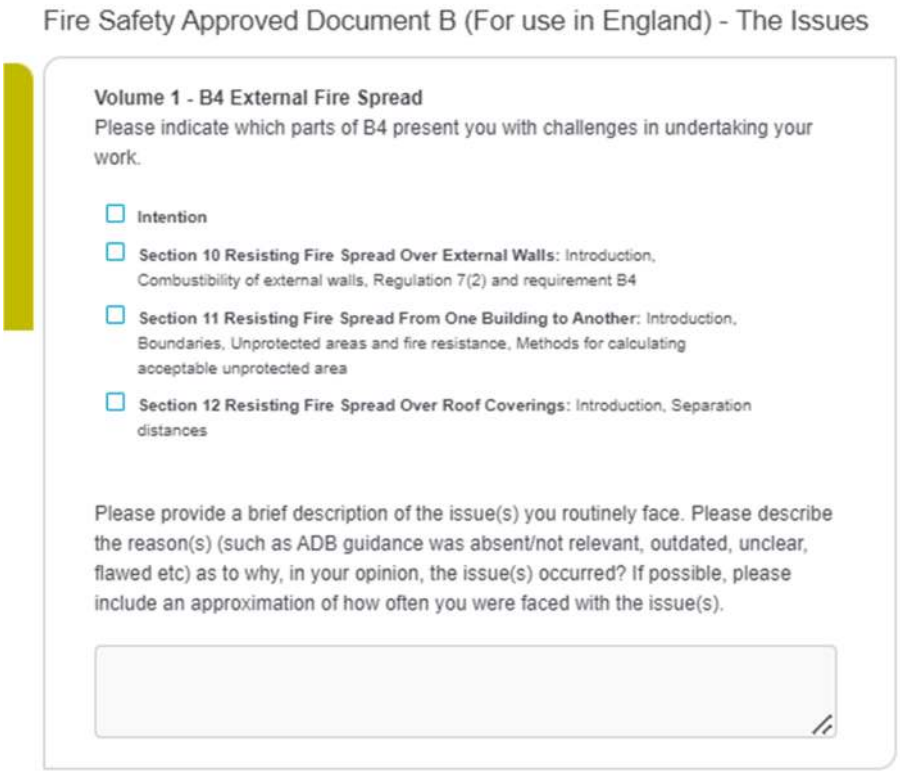
Fire Safety Approved Document B (For use in England) - The Issues

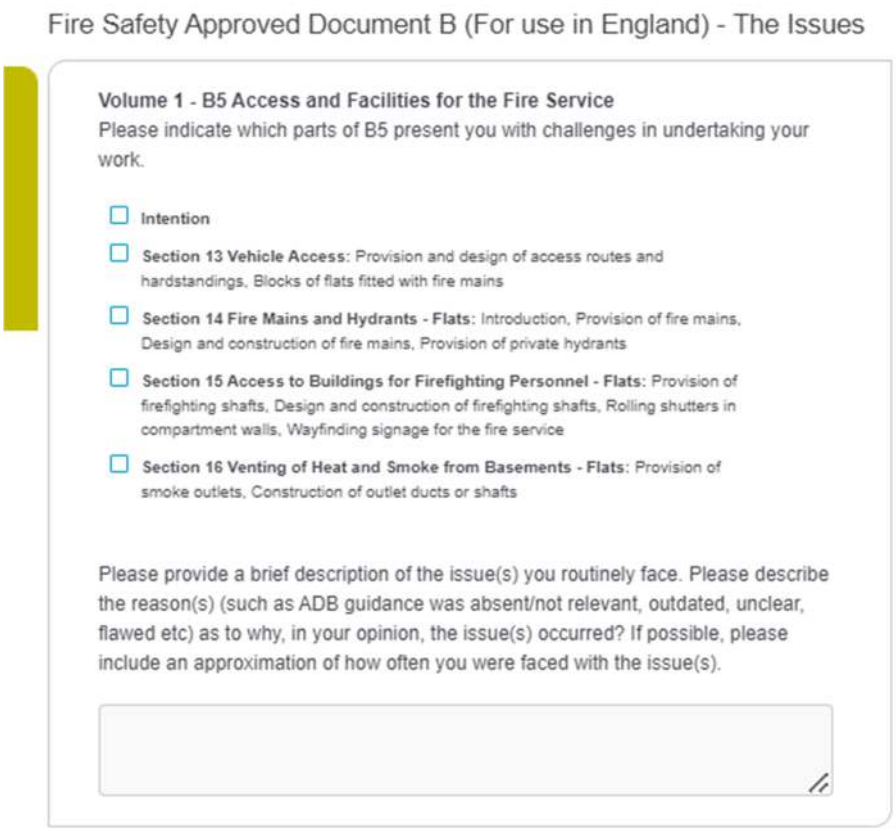
Volume 1 - B3 Internal Fire Spread (structure)

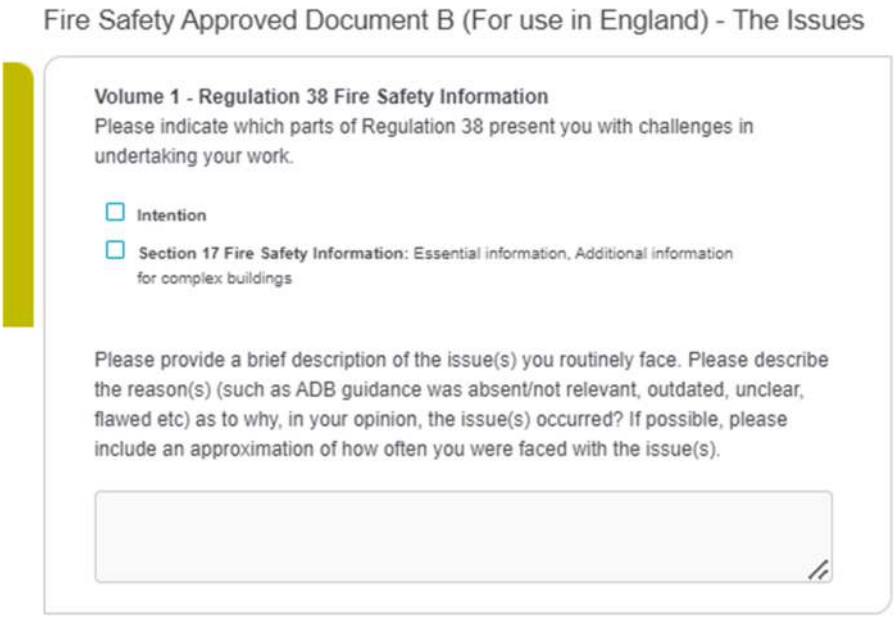
Please indicate which parts of B3 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 5 Internal Fire Spread - Dwellinghouses:** Loadbearing elements of structure, Compartmentation, Cavities
- ☐ **Section 6 Loadbearing Elements of the Structure:** Fire resistance standard, conversion to flats
- ☐ **Section 7 Compartmentation/Sprinklers - Flats:** Provision of compartmentation, Sprinklers, Construction of compartment walls and compartment floors, Openings in compartmentation, Protected shafts
- ☐ **Section 8 Cavities - Flats:** Provision of cavity barriers, Pathways around fire-separating elements, Construction and fixings for cavity barriers
- ☐ **Section 9 Protection of Openings and Fire-stopping:** Introduction, Openings for pipes, Mechanical ventilation and air-conditioning systems, Flues, etc., Fire-stopping

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).







Fire Safety Approved Document B (For use in England) - The Issues

Volume 1 - Appendices

Please indicate which parts of the Appendices present you with challenges in undertaking your work.

- ☐ **Appendix A - Key Terms**
- ☐ **Appendix B - Performance of Materials, Products and Structures:** Introduction, Reaction to fire, National classifications for reaction to fire, Thermoplastic materials, Roofs, Fire resistance, Application of the fire resistance standards in Table B4
- ☐ **Appendix C - Fire Doorsets**
- ☐ **Appendix D - Methods of Measurement:** Occupant number, Travel distance, Width, Building dimensions, Free area of smoke ventilators
- ☐ **Appendix E - Sprinklers:** Sprinkler systems, Design of sprinkler systems, Water supplies and pumps
- ☐ **Appendix F - Standards Referred To:** European Standards, British Standards
- ☐ **Appendix G - Documents Referred To:** Legislation, Other documents

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - B1 Means of Warning and Escape

Please indicate which parts of B1 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 1 Fire Detection and Alarm Systems:** General provisions, Fire detection and alarm systems, Design and installation of systems
- ☐ **Section 2 Design for Horizontal Escape:** Introduction, Escape route design, Residential care homes
- ☐ **Section 3 Design for Vertical Escape:** Introduction, Number of escape stairs, Provision of refuges, Width of escape stairs, Design and protection of escape stairs
- ☐ **Section 4 Small Premises:** Construction, Travel distance and number of escape routes, Escape stairs in small premises
- ☐ **Section 5 General Provisions:** Introduction, Protection of escape routes, Doors on escape routes, General provisions, Lifts, Refuse chutes and storage, Shop store rooms

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - B2 Internal Fire Spread (linings)

Please indicate which parts of B2 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 6 Wall and Ceiling Linings:** Classification of linings, Thermoplastic materials

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - B3 Internal Fire Spread (structure)

Please indicate which parts of B3 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 7 Loadbearing Elements of the Structure**: Fire resistance standard, raised storage areas
- ☐ **Section 8 Compartmentation/Sprinklers**: Provision of compartmentation, Sprinklers, Construction of compartment walls and compartment floors, Openings in compartmentation, Protected shafts
- ☐ **Section 9 Cavities**: Provision of cavity barriers, Pathways around fire-separating elements, Extensive cavities, Construction and fixings for cavity barriers
- ☐ **Section 10 Protection of Openings and Fire-stopping**: Introduction, Openings for pipes, Mechanical ventilation and air-conditioning systems, Flues, etc., Fire-stopping
- ☐ **Section 11 Special Provisions for Car Parks**

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - B4 External Fire Spread

Please indicate which parts of B4 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 12 Resisting Fire Spread Over External Walls**: Introduction, Combustibility of external walls, Regulation 7(2) and requirement B4
- ☐ **Section 13 Resisting Fire Spread from One Building to Another**: Introduction, Boundaries, Unprotected areas and fire resistance, Methods for calculating acceptable unprotected area
- ☐ **Section 14 Resisting Fire Spread Over Roof Coverings**: Introduction, Separation distances

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - B5 Access and Facilities for the Fire Service

Please indicate which parts of B5 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 15 Vehicle Access:** Buildings not fitted with fire mains, Buildings fitted with fire mains, Design of access routes and hardstandings
- ☐ **Section 16 Fire Mains and Hydrants:** Introduction, Provision of fire mains, Design and construction of fire mains, Provision of private hydrants
- ☐ **Section 17 Access to Buildings for Firefighting Personnel:** Introduction, Provision of firefighting shafts, Design and construction of firefighting shafts, Rolling shutters in compartment walls
- ☐ **Section 18 Venting of Heat and Smoke from Basements:** Provision of smoke outlets, Construction of outlet ducts or shafts, Basement car parks

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - Regulation 38 Fire Safety Information

Please indicate which parts of Regulation 38 present you with challenges in undertaking your work.

- ☐ **Intention**
- ☐ **Section 19 Fire Safety Information:** Essential information, Additional information for complex buildings

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

bre

Fire Safety Approved Document B (For use in England) - The Issues

Volume 2 - Appendices

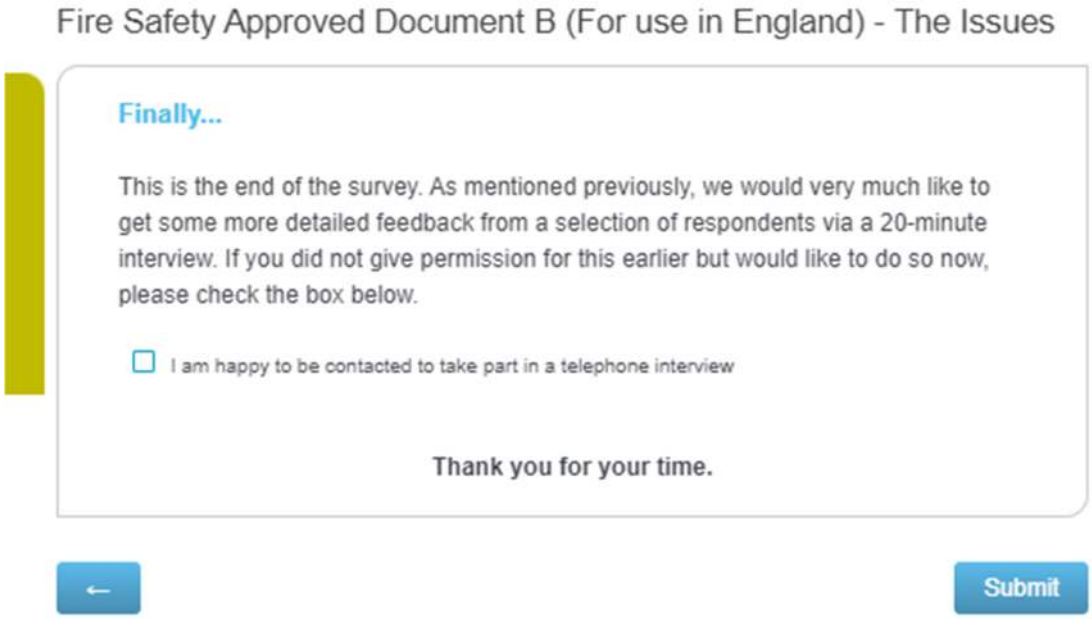
Please indicate which parts of the Appendices present you with challenges in undertaking your work.

- ☐ **Appendix A - Key Terms**
- ☐ **Appendix B - Performance of Materials, Products and Structures:** Introduction, Reaction to fire, National classifications for reaction to fire, Thermoplastic materials, Roofs, Fire resistance, Application of the fire resistance standards in Table B4
- ☐ **Appendix C - Fire Doorsets**
- ☐ **Appendix D - Methods of Measurement:** Occupant number, Travel distance, Width, Building dimensions, Free area of smoke ventilators
- ☐ **Appendix E - Sprinklers:** Sprinkler systems, Design of sprinkler systems, Water supplies and pumps
- ☐ **Appendix F - Standards Referred To:** European Standards, British Standards
- ☐ **Appendix G - Documents Referred To:** Legislation, Other documents

Please provide a brief description of the issue(s) you routinely face. Please describe the reason(s) (such as ADB guidance was absent/not relevant, outdated, unclear, flawed etc) as to why, in your opinion, the issue(s) occurred? If possible, please include an approximation of how often you were faced with the issue(s).

2.3 If you would like to suggest additional or alternative approaches to some part(s) of ADB guidance e.g. if you believe an industry technical paper, guide or research report would provide equivalent and clearer practical guidance, please provide details.

Alternatively, if you believe another National Standard would provide equivalent and clearer practical guidance, please provide details.



Appendix C Creation of the heat maps for AD B Volumes 1 and 2

This Appendix contains the progression of how the heat maps were created for AD B Volumes 1 and 2.

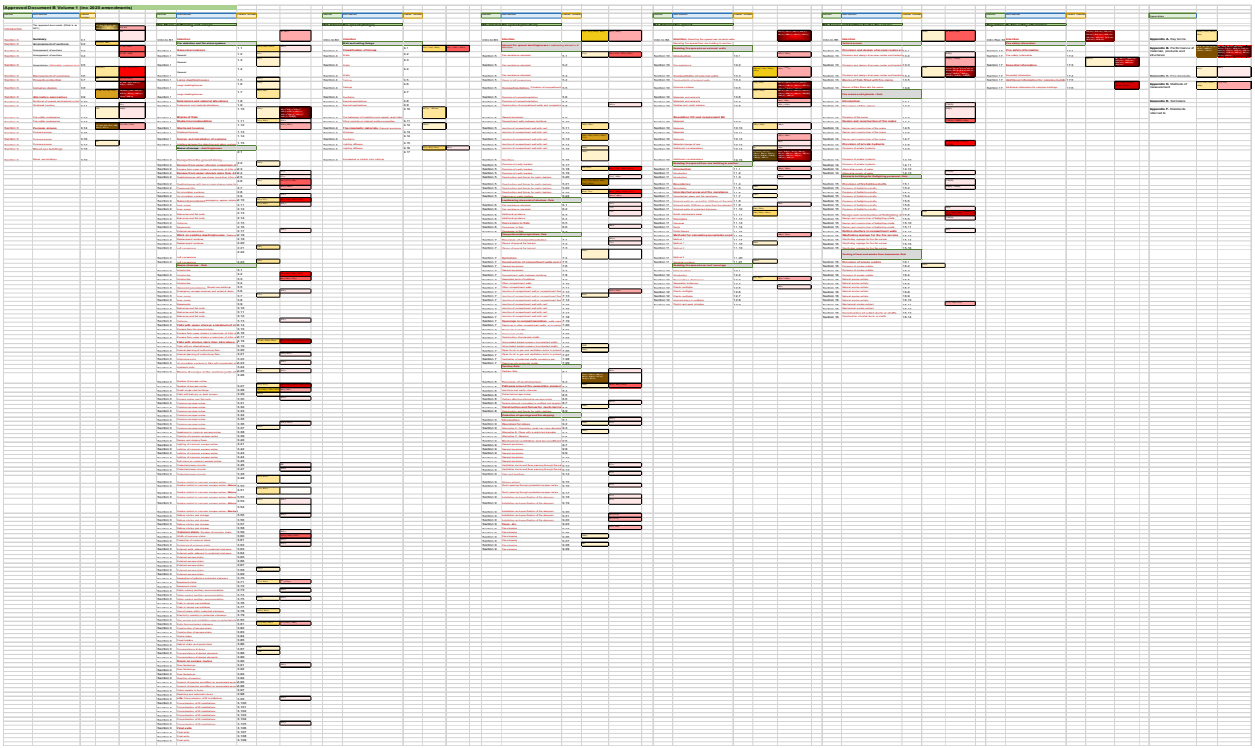


Figure C1 – Heat map from Volume 1 survey responses

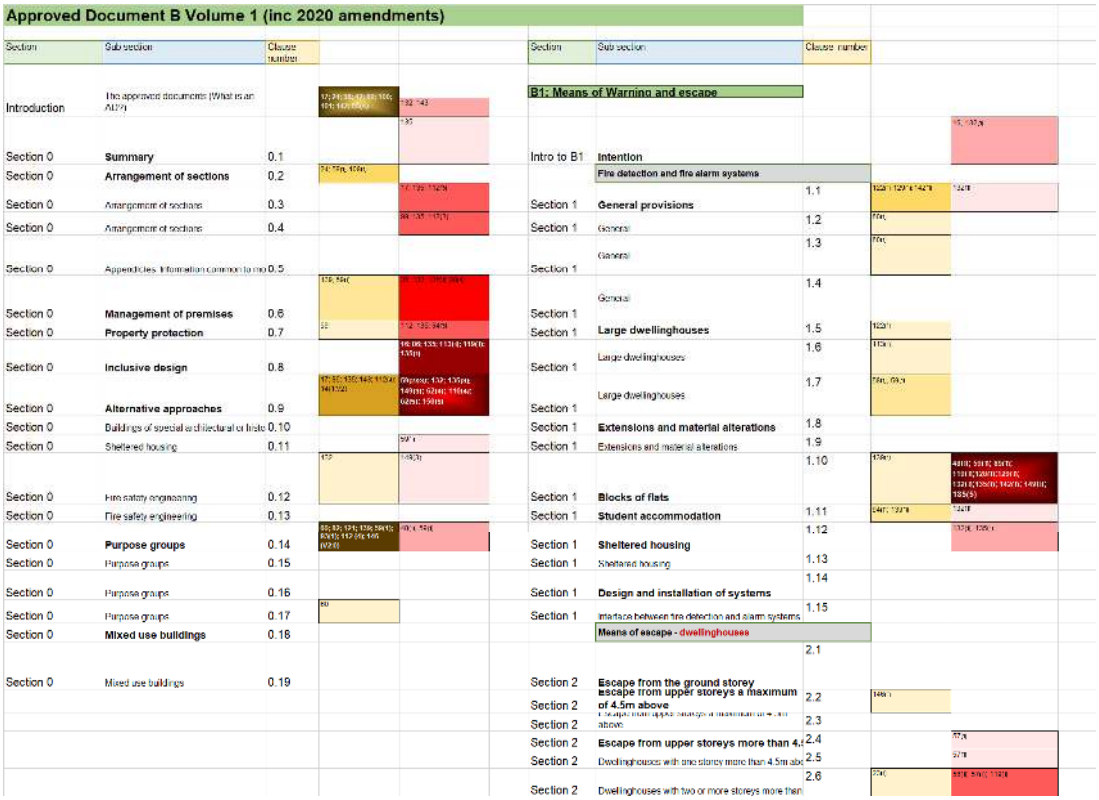


Figure C2 – Close up view of the top left quadrant of heat map shown in Figure C1

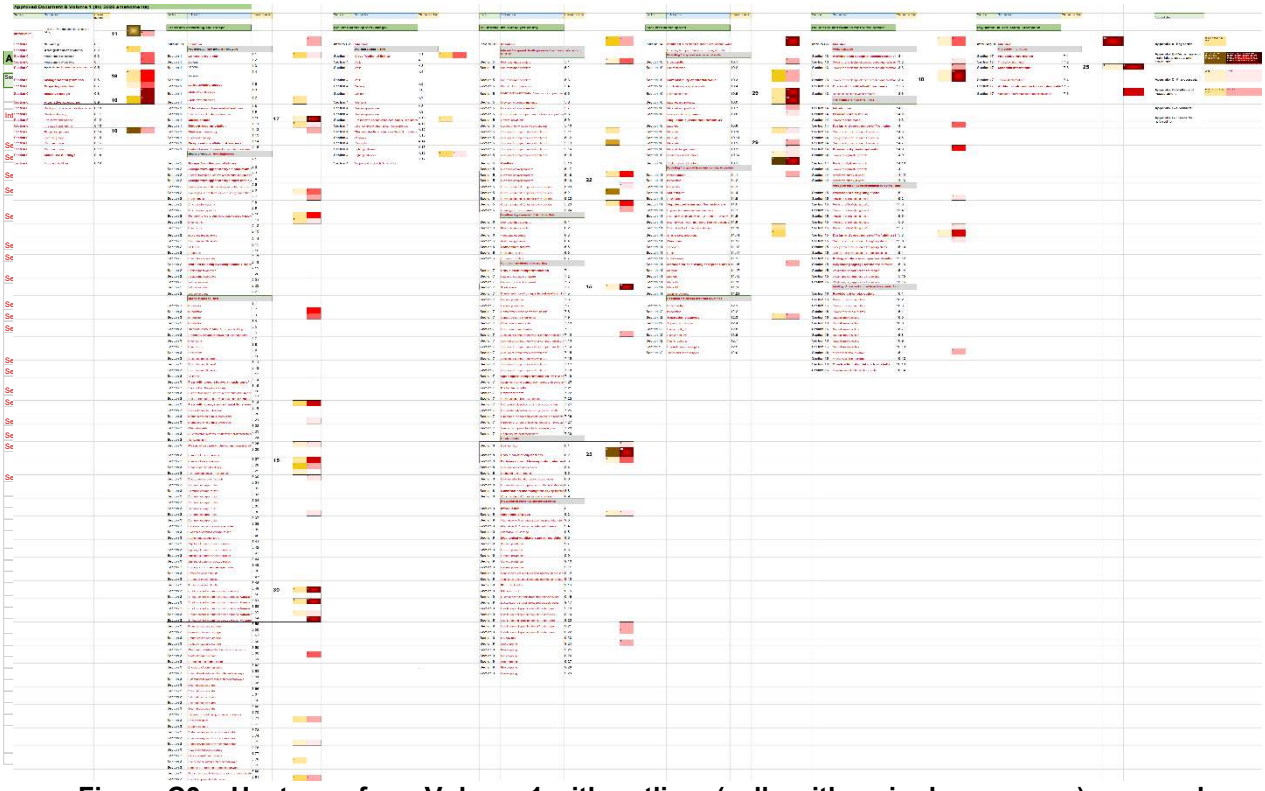


Figure C3 – Heat map from Volume 1 with outliers (cells with a single response) removed

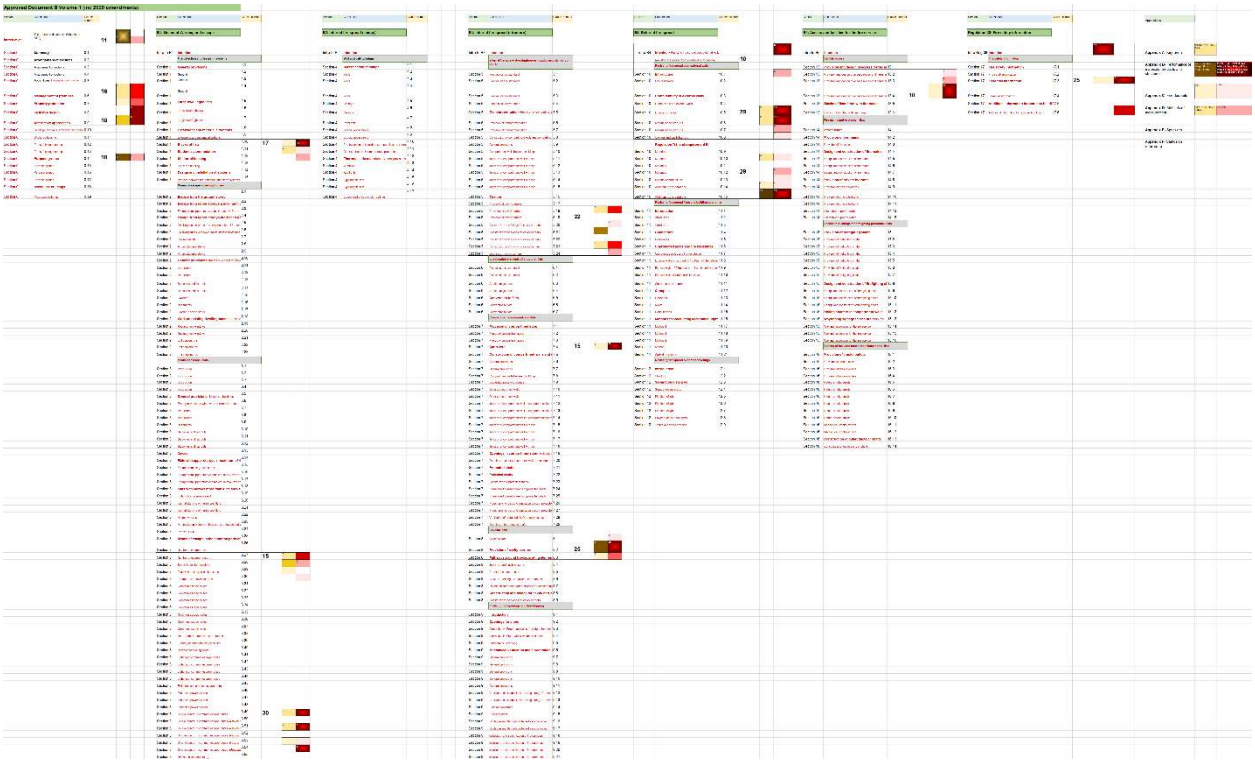


Figure C4 – Hot spots from Volume 1 showing a paragraph (or related paragraphs) attracting 10 or more 'hits'

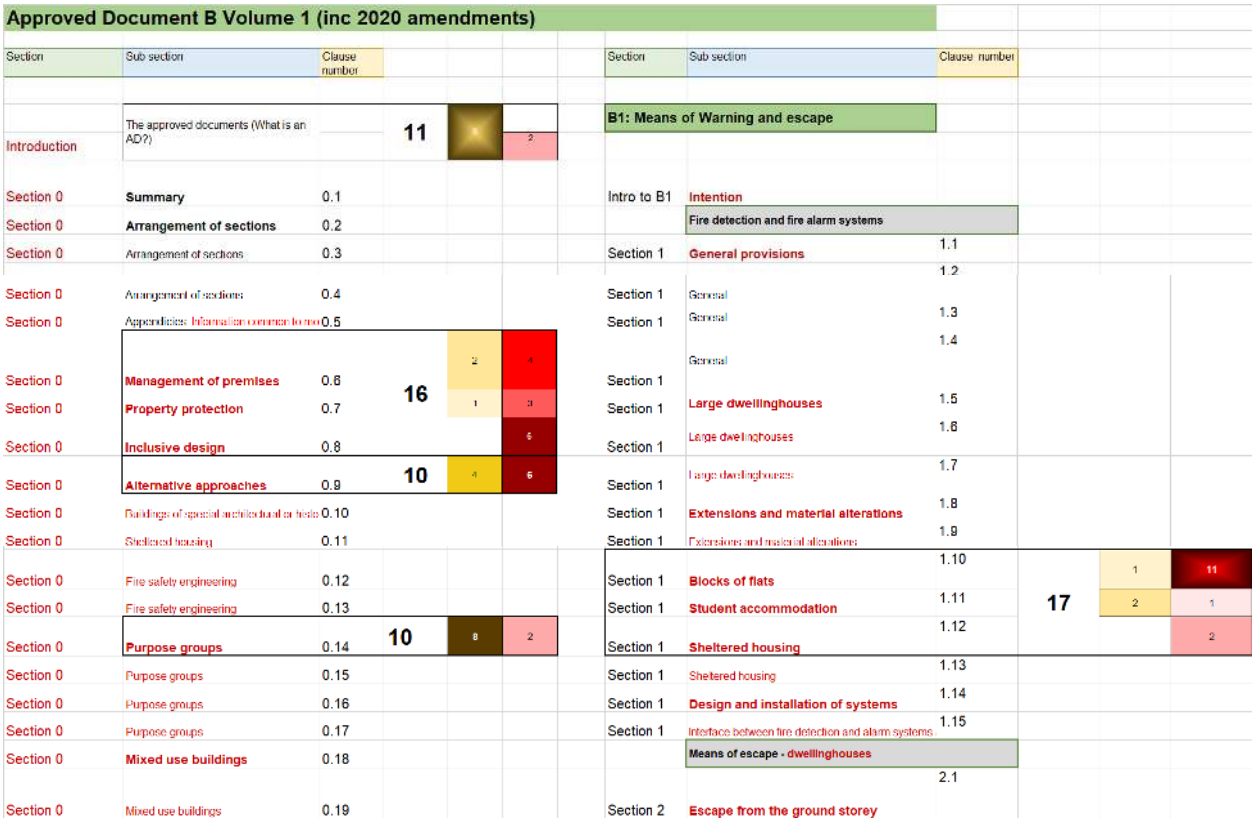


Figure C5 – Close up view of the top left quadrant of Hot spots shown in Figure C4

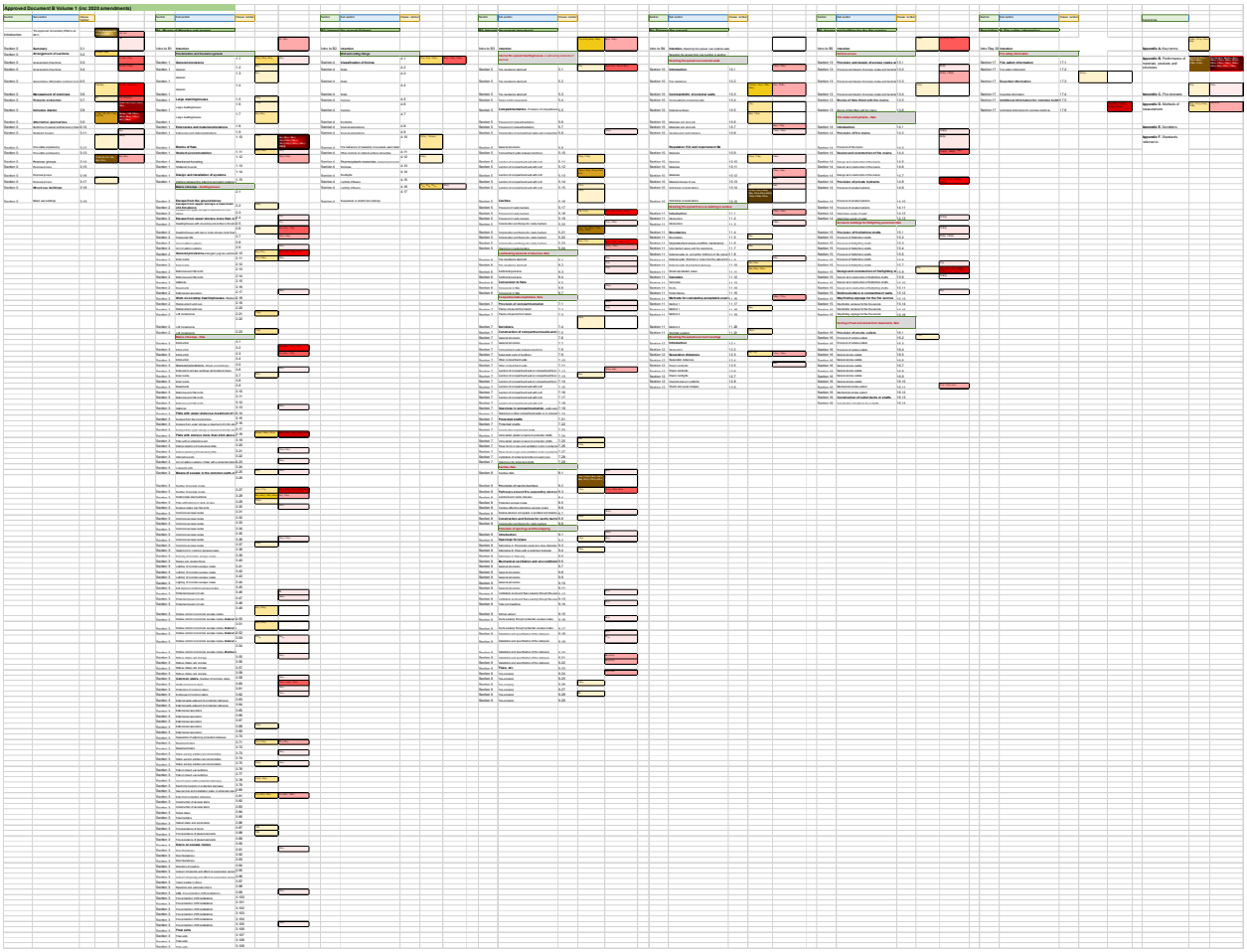


Figure C6 – Heat map from Volume 2 survey responses

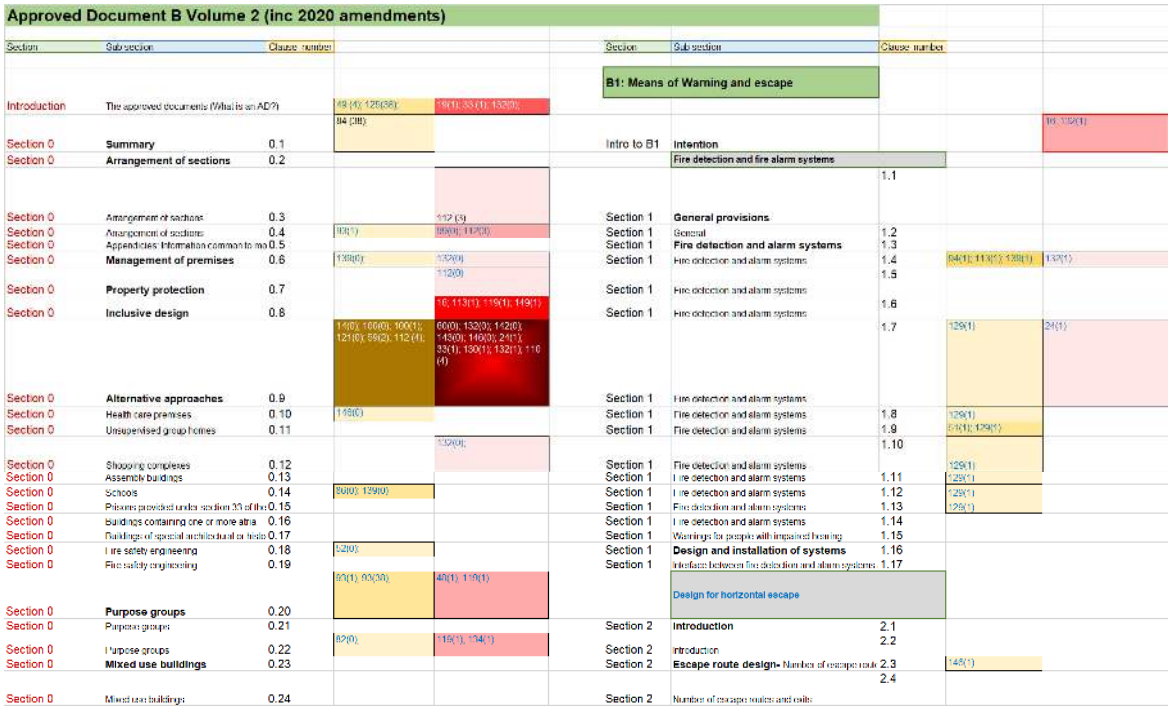


Figure C7 – Close up view of the top left quadrant of heat map shown in B6

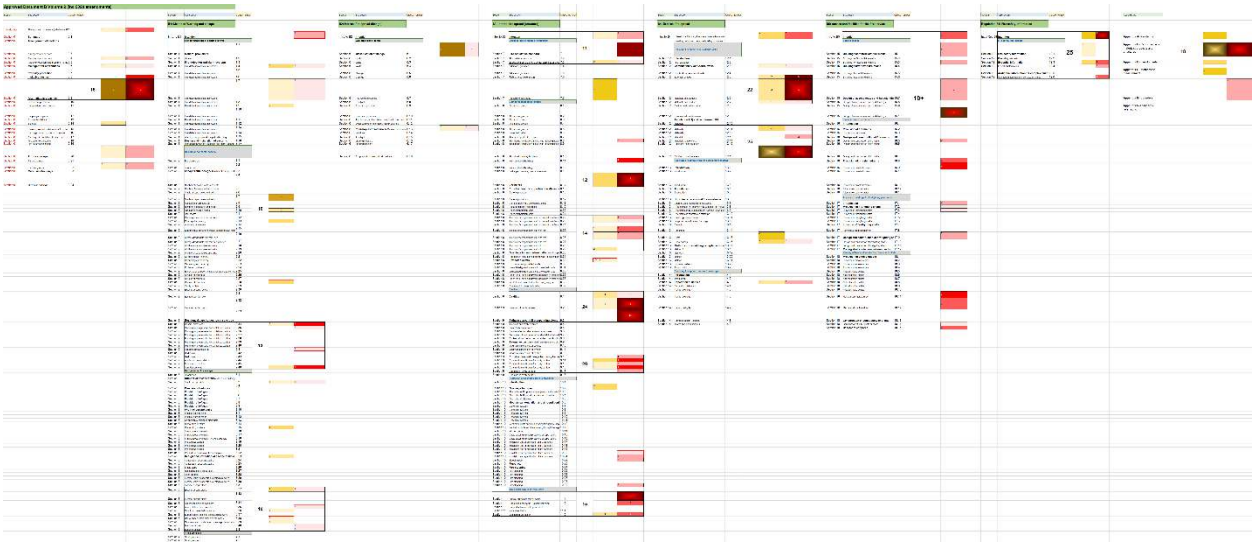


Figure C8 – Heat map from Volume 2 with outliers (cells with a single response) removed

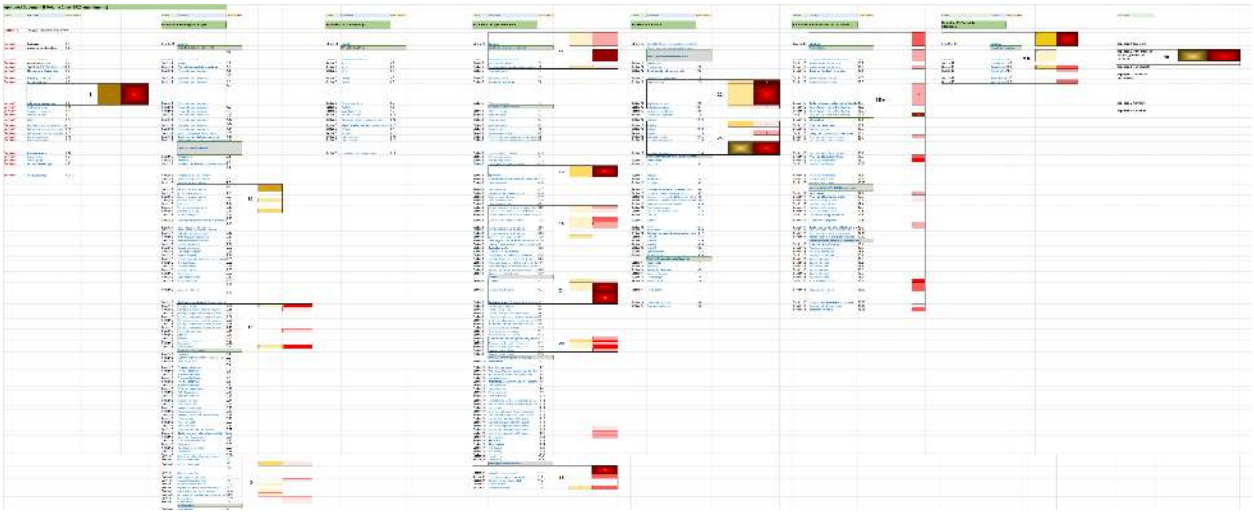


Figure C9 – Hot spots from Volume 2 showing a paragraph (or related paragraphs) attracting 10 or more 'hits'

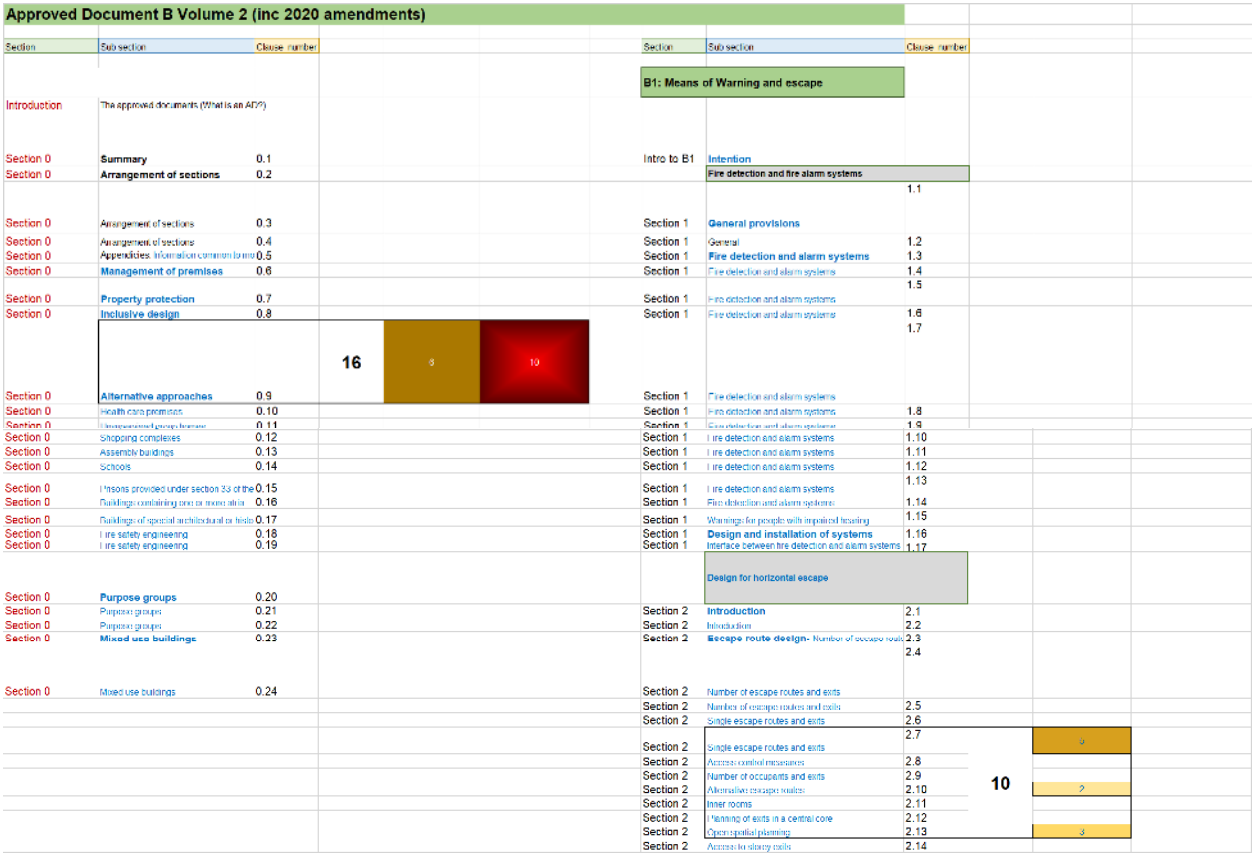


Figure C10 – Close up view of the top left quadrant of Hot spots shown in Figure C9

Appendix D Heat map for AD B Volume 1

This Appendix contains the heat map for AD B Volume 1.

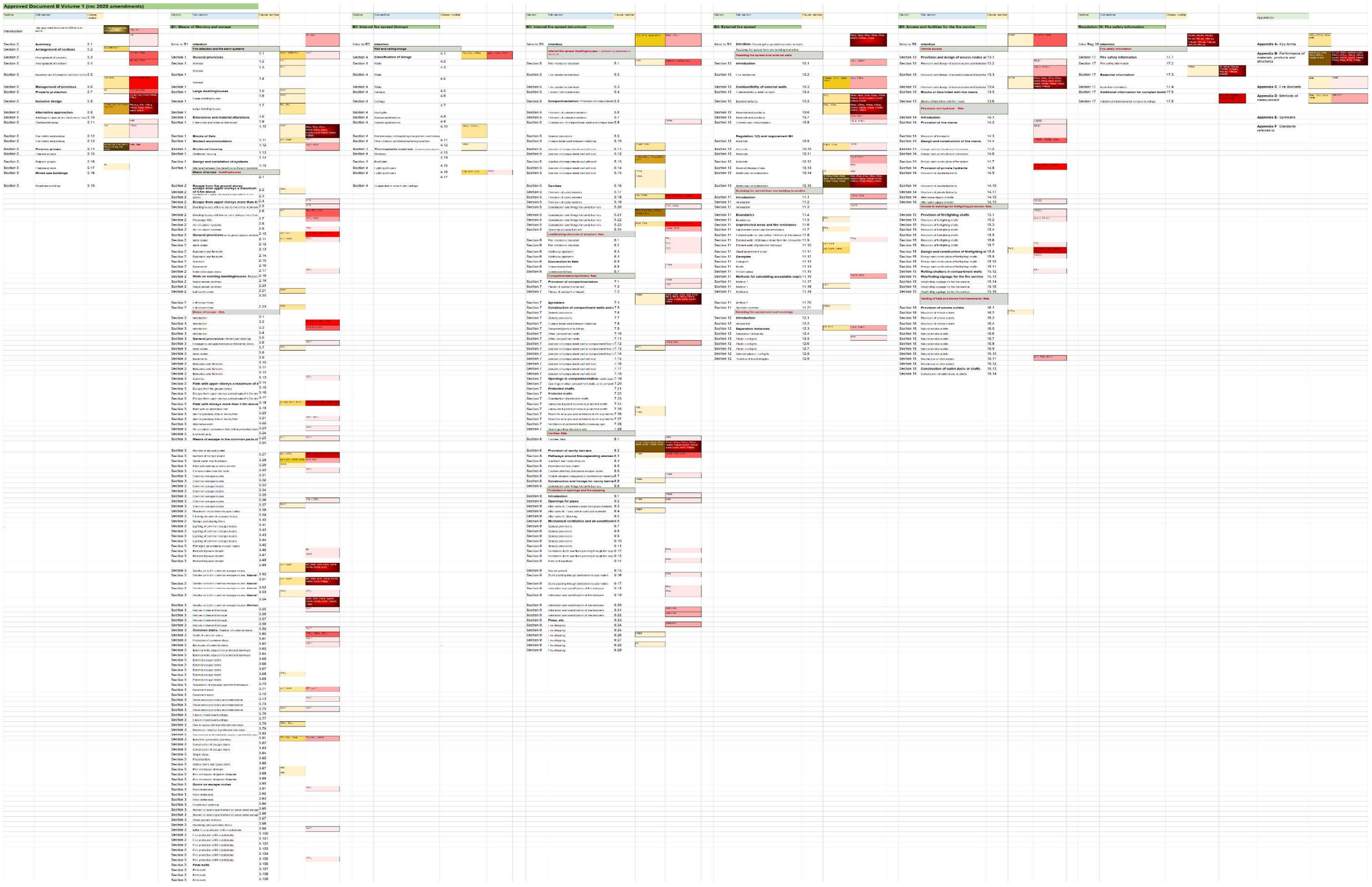


Figure D1 – Heat map for AD B Volume 1

Appendix E Heat map for AD B Volume 2

This Appendix contains the heat map for AD B Volume 2.

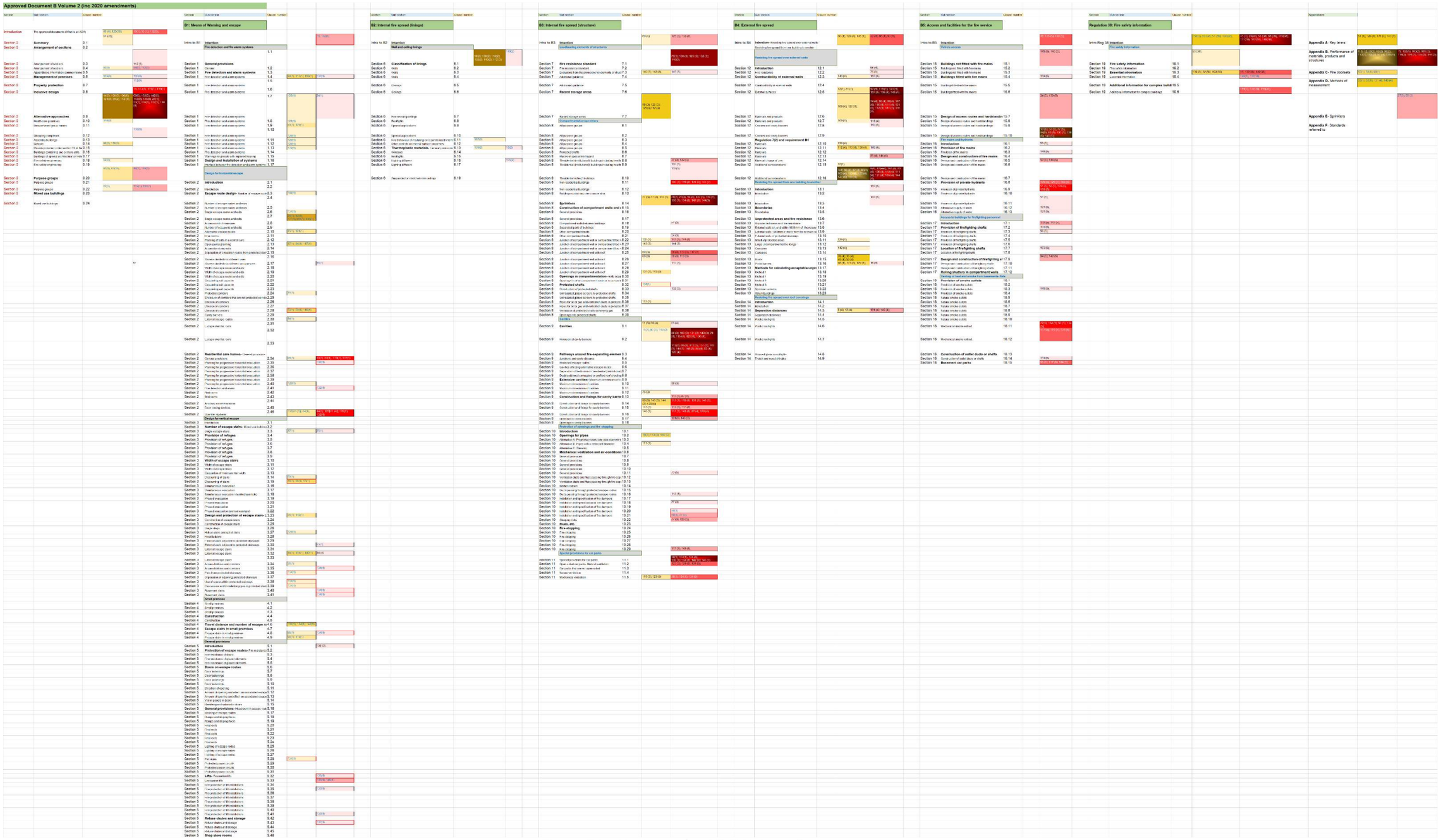


Figure E1 – Heat map for AD B Volume 2

bre

Appendix F BRE Global distillation of survey 'Hot spot' responses for AD B Volumes 1 and 2

The approved documents

What is an approved document?

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Introduction	17	☑		☑		What are common building situations that the document can/cannot apply to? In BRE Global's view this is a genuine "modern innovative construction technology or design" issue. Respondent wants to draw attention to the findings of the 2017 usability research. BRE Global is focussing on Modern Innovative Construction Technologies, Design and Building Use and therefore the following would be legitimate requests to assist with 'modern' designs more, not less, prescription (this complies because...) hyperlinks and review purpose groups.
	24	☑				This was placed in Section 0. BRE Global believes its more appropriate under section: The Approved Documents (What is an approved Document and User requirements). It resonates just enough to be included as a critique about "what does the document cover and what does it not". There is also a critique about standards training and competency which is not part of this workstream.
	36	☑		☑		What are common building situations that the document can/cannot apply to? In BRE Global's view this is a genuine "modern innovative construction technology or design" issue.
	42	☑		☑		This respondent's answer is not a critique of modern construction but it is a critique of how modern design is developed. Anyone can and does have a go. BRE Global notes the respondent saying "we refer them to AD B and they do not understand it..."

						Accordingly, BRE Global believes this is a request to be firmer in the paragraphs titled: User requirements and Where can you go to get further help. If the users are not able to understand the guidance : i) the guidance may be confused ii) the people reading it may not be sufficiently trained in fire safety and iii) there may be an element of both influencing this.
	60	☑		☑		What are common building situations that the document can/cannot apply to? In BRE Global's view this is a genuine "modern innovative construction technology or design" issue.
	100	☑		☑		What are common building situations that the document can/cannot apply to? In BRE Global's view this is a genuine "modern innovative construction technology or design" issue
	101	☑		☑		BRE Global's view is that this comment cites confusion and lack of understanding as to its status. The best location is not Section 0 but the introduction section and What is an approved document. In BRE Global's view this is a genuine "modern innovative construction technology or design" issue.
	142			☑		BRE Global's comment is although the item uses high rack storage as the example the respondent is suggesting more guidance on common building types is needed.
	55 (1)	☑		☑		The respondent seeks clearer guidance on testing. Should systems or products be tested? The respondent reports that there is still confusion and a wide difference in interpretation. Additionally, can the introduction to AD B make clear that if other requirements e.g. Local Planning Authority and or GLA and (or other) are more onerous than Building Regulations (effectively demanding Building Regulations++ compliance) then those requirements fall outside the scope of AD B. BRE Global observes this latter point causes confusion in the industry and may even lead to technical conflicts. The standing of AD B must be clear.
	132				☑	The respondent believes the question of "common forms of construction" needs to be addressed. The respondent considered that timber frame is now "common" and modular and CLT are both

						"increasingly popular". The point being made is should the AD B refer to "common" of "appropriate forms of construction"? The consideration is that AD B is not "appropriate" where the walls are combustible and protected only by plasterboard. Plasterboard encasement of combustibles is not durable over the life of the building. Concepts such as char and self-extinguishment of flame when considering mass timber (i.e. CLT construction) is not proved at scale. This respondent is not seeking clarification on "common" but "appropriate". Wants combustible walls to be completely reconsidered. The respondent goes on to suggest disabled people are not adequately catered for in buildings which have combustible walls. The respondent cites Beechmere Extra care home as a near miss fire event from the perspective of rescue of disabled people from specialised housing - i.e. where the walls of the building were combustible. The passage in AD B about users not possessing the correct technical knowledge needing to seek assistance is not noticed. BRE Global's comment/suggestion ... could it be emboldened? The point then goes on to suggest that if the Grenfell Inquiry is uncovering widescale lack of due diligence, supervision, oversight and cost cutting then AD B needs to factor this into the 'guidance'. BRE Global's comment/question... Is there merit in having the equivalent to robust standard details (that exist for compliance with Part E) for Part B? Would this give the levels of "redundancy" that the respondent believes necessary to accommodate workmanship defects? Third party certification runs the risk of diluting technical competence because of the way schemes are funded. Should funding be looked at so that only the best most diligent firms get registered? Doing the right thing costs money. Lastly, Part L and Part B need to be looked at together. BRE Global's view: This respondent covers a lot of issues the majority are relevant to Modern, Innovative, Construction Technology, Design and Building Use.
	143				☑	The AD B intro says "... approved documents cannot cater for all circumstances, variations and innovations."

						The respondent suggests this is not ambitious enough and perhaps if not "all innovations..." could it guide on "some of the most common ?"

Section 0: Approved Document B: Fire safety – dwellings

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Management of premises (0.6)	35				☑	Respondent points out that there have been near misses with fires in protected entrance halls of flats where mobility scooters have been left charging. The problem relates to use of lithium-ion batteries. Note BRE Global moved this from a B1 issue only to Introduction and B1.
	59 (1)	☑	☑	☑		The role of management in complex buildings can become lost over time. Information (Regulation 38) does not get retained updated. Where previously the Fire and Rescue Service would have been able to appraise a building (at least initially) on efficacy of the prescriptive measures, one now needs to consider management and the overall strategy. More prescription needed rather than less. Also, 'management' in dwellings is significant. Modern designs incorporating open plan layouts coupled with a modern 'trend' of leaving the children's bedroom doors ajar at night (to listen out for them) means passive measures may be compromised at the outset. Prescription therefore has merit. Public information films no longer aired in the media e.g. "close doors at night" and or "plan your escape in case of fire". Firmer guidance needed if one cannot control management.
	132				☑	The respondent is challenging the belief that housing associations/landlords can access individual flats and inspect to 'manage' the condition of plasterboard – required to protect combustible structures (at least in part). The respondent contends If management is not possible then combustible construction should not be allowed.
	135 (1)				☑	Stay put will on occasions become untenable. Extended travel distances, sub-division of corridors, ventilation of corridors, safe refuge designs

						(size/location) provision of firefighting lifts all need review. It seems diagram 15.1(b) now no longer tenable.
	139	☑		☑		The respondent says applicants often argue that the building will be well managed to "relax" a requirement. BRE Global's experience is that this rings true - designers often refer to highly managed buildings but there is no baseline. HTM and BB100 not being used enough by designers and checkers. BRE Global comment is that this is not a Modern, Innovative Construction Technology or Design or Building Use comment. It is an observation of lack of care by designers and regulators.
	28 (4)				☑	Do timber treatments, applied to improve reaction to fire performance, need to be re-applied? Guidance needed on UV degradation and weathering. Ongoing controls to be dealt with under management of premises.
Property protection (0.7)	59	☑		☑		Not going as far as requesting property protection. Respondent acknowledges the intent of Part B was life safety. BRE Global's observation: Is insurance industry "demanding higher standards" or is there an issue to discuss here? BRE Global's observation is this is leaving the question of property protection.
	112				☑	The respondent wants true cost of large fires in 'combustible buildings' to be properly calculated to include: Social, environmental and economic costs. The respondent elaborated on the true cost of the environmental clean-up in the event of a significant fire. BRE Global's view is that this comment is not a direct Modern Innovative Construction Technology or Design or Building Use but it is a point well made that fires in buildings comprised of MICT needs to be properly costed.
	135				☑	Stay put will on occasions become untenable. Extended travel distances, sub-division of corridors, ventilation of corridors, safe refuge designs (size/location) provision of firefighting lifts all need review. It seems diagram 15.1(b) now no longer tenable.
	64 (3)				☑	The respondent believes fires should not be allowed to spread from one bedroom to the next via roof voids.

						BRE Global believes this would be a property protection versus life safety argument and places it as 0.7.
Inclusive design (0.8)	16				☑	Respondent says mobility impairment is the most underdeveloped part of AD B. BRE Global observes that this respondent has 'ticked' every section. In BRE Global's opinion they intend for mobility impairment issues to be considered across all parts of AD B. The comment has been repeated in both Volumes under S 0, B1, B5 and Regulation 38.
	86				☑	The Approved Document refers to inclusive design but there is only one piece of guidance in section 3.107 for disabled people and two pieces under Regulation 38 - there is no meaningful design guidance. The concept of stay put for disabled people is outdated. Full (new ?) guidance is needed - proper refuges and remote monitoring of communication devices and how evacuation lifts are operated in fire event.
	135				☑	Stay put will on occasions become untenable. Extended travel distances, sub-division of corridors, ventilation of corridors, safe refuge designs (size/location) provision of firefighting lifts all need review. It seems diagram 15.1(b) now no longer tenable.
	113 (1)				☑	The respondent points out that there are standards of building use under M4(2) and M4(3) and that escape windows are not compatible with modern designs; particularly when considering dignified escape for disabled people. The respondent asks whether provisions should include emergency voice communication in lobbies and evacuation lifts. Note: London Plan (D5(B5)) which, if implemented, will require evacuation lifts (minimum one per stair core).
	119 (1)				☑	New item, seeking to fill a gap in technical content: The respondents consider people with a disability need to be thought about in terms of Means of Escape. The matters such as evacuation lifts and refuges are now considerations. The range of disabilities has for too long been too narrowly focussed. BRE Global's observation: Current designs are being challenged and designers asked to demonstrate they are considering the likely tenants and their physical, neuro and medical diversity – short/medium/long term) diversity. The respondent suggests even in a dwellinghouse setting one should be considering a platform lift to get

						to the storey exit in emergency. More consideration and more guidance needed.
	135 (1)				☑	Section 0.7 New item, seeking to fill a gap in technical content. Acknowledges that property protection should remain with the building owner and insurer but, in the case of an asset protection which is inextricably linked to life safety then regulations should broaden to address asset protection for reasonable periods. BRE Global assumes this asset protection to be applicable to all types of residential use. Section 0.8 Seeks to fill gap in technical content Respondents wish for fundamental review of people behaviour and capabilities (the less mobile not wheelchair users per se). What constitutes vulnerable? BRE Global notes this is currently under review with other Part B workstreams. At present disabled people are included in guidance on final exits and Regulation 38 - nothing else.
Alternative approaches (0.9)	14 (1: V2)	☑				If it is intended that BS 9999 could be used in its entirety (in lieu of following AD B or BS 7974) then could paragraph 0.9 be more explicit about the acceptability of using BS 9999 from cover to cover. Define what is to be ignored from the BS 9999 document too.
	17	☑		☑		What are common building situations that the Approved Document B can apply to?
	59 (2)				☑	The respondent identifies the gap in guidance on specialised housing. Older people are staying in their homes longer therefore these 'uses' should not be considered akin to general needs housing. Respondent makes point that some Local Authorities cannot afford membership of Barbour Index or IHS (or other)? If so, there is a bigger issue here... should alternative approaches espoused in 0.9 be spelled out in AD B alternatively, should British Standards be available Free of Charge?
	59 (3)				☑	The points the respondent makes are broadly similar to those made under B2. Rather than double count BRE Global will acknowledge that they were repeated as B3 responses.
	86			☑		The respondent is suggesting that people sometimes seek loopholes by using alternative approaches. This

						suggest there should be clear guidance on use of 'alternative provisions'.
	132				☑	The respondent is challenging the belief that housing associations/landlords can access individual flats and inspect to 'manage' the condition of plasterboard – required to protect combustible structures (at least in part). The respondent contends if management is not possible then combustible construction should not be allowed.
	135	☑	☑			The respondent wants AD B to revise every time BS 9991 or BS 9999 is revised.
	135 (3)				☑	The respondent says that the habit of reducing another safety provision by virtue of introduction of sprinklers is not acceptable. Although a Volume 2 matter, the respondent cites removal of door closers in care homes if sprinklers installed as being a retrograde step.
	143		☑	☑		Respondent says the https://www.cwct.co.uk/pages/cwct-sfe-fire-guidance was produced by CWCT and SFE as a simple guide to complying with 7(2), 7(3) and 7(4)? BRE Global believes this is a request to add to paragraph 12.15 additional considerations. How would this be verified by DLUHC?
	149 (3)				☑	The respondent points to the likelihood of errors in construction and suggests this should be built into guidance/expectations/redundancy. BRE Global found that this needed to be acknowledged in the preamble or section 0 guidance. Also, if acknowledging it in 'general' guidance, it should also be acknowledged in fire engineering approaches. Also the respondent points out that if errors are discovered with traditional construction, it can be corrected but it may be that if there are errors with MMC and 'units' are craned into position that opportunity to see an error may be lost.
	62 (4)				☑	This respondent believes the culture is wrong and perhaps more prescriptive requirements are needed.
	110 (4)				☑	If Paragraph 10.6 is to be correctly interpreted (as a follow-on from Regulation 7(2)) perhaps a sentence is needed, at the end of 10.6, that disapplies paragraph 0.9 as alternative approach as far as 10.6 goes?

	112 (4)	☑				The respondent provided a full response touching on considerations and suggestions. Considerations: i) The 'ban' should be on high rise and high risk buildings. ii) The Hackitt Review and the Public Inquiry have both identified a shortfall in competence in design, construction ongoing maintenance of buildings. Add to this, combustible materials, and there is then a strong likelihood of large fire/fire spread. If you remove combustibles this lessens the risk. Suggestion: i) Assembly buildings should be included in the ban. ii) the trigger height should reduce from 18m to 11m (a height which is WITHIN Fire and Rescue Service's capabilities and NOT at the limit of their capabilities). BRE Global notes the respondent states "AD B still allows BS 8414 - BR 135 route for buildings over 18m". BRE Global also notes the respondent asks that the 'ban' should apply to many uses that the ban already applies to under Regulation 7(4)(a)ii and iii. BRE Global also notes that the respondent believes an 11m trigger or a fourth storey trigger (whichever the lower) should apply. BRE Global assumes the respondent means if the building has a fifth storey or fourth floor level? In summary: A diagram with footnote(s) would help make clearer the buildings to which guidance clause 10.10 applies and what Regulation 7(2) means. Perhaps include a note that for the purposes of this paragraph alternative approaches (as per paragraph 0.9) disapplies.
	62 (5)	☑		☑		The respondent believes designers increasingly avoid AD B guidance and engage the services of a fire engineer to argue a counter case. BRE Global interprets the respondent's comments as supporting the view that more prescription is what is needed to avoid submissions. BRE Global also observes that AD B is not where one would expect to find mandatory 'guidance'- not its purpose. The precedent (for mandatory provisions) was established with the 1985 Building Regulations and the Mandatory rules for means of escape in case of fire. Currently Regulations 6(3) and 7(2) are 'mandatory'.
	150 (5)				☑	The respondent suggests that stair widths need review to consider contraflows and obstructions on stairs

						(hoses) all now needs review. The respondent also suggests the time may be right to consider secondary stairs, firefighting lifts and the functionality (controls) of these lifts. The requirements should not be designed out by fire engineering. BRE Global includes Paragraph 0.9 as this seems the only logical place to pick up those alternative approaches might not be suitable in all instances.
Purpose groups (0.14)	48 (1)	☑	☑			The respondent notes the previous guidance on HMOs (page 6 of the April 2019 version) has been removed. BRE Global notes the definition of 'six persons living as a single household' guidance is still in place in Appendix A: Key Terms - under 'dwelling'. However, the bigger point is the loss of the paragraph titled Houses in Multiple occupation so there is no steer as to which Volume to use for HMOs. BRE Global believes the conversion from multi storey dwellinghouse to an HMO, serving seven or more persons, is a modern design 'trend'. Guidance is needed.
	59 (1)	☑	☑	☑	☑	Are holiday lets (Air B'n'B, apart-hotels) other residential or dwellings? There are multiple forms of specialised housing that need placing in a purpose group in table 0.1. A purpose group is needed for houses in multiple occupation. Following purpose group review, specific guidance may be revised or needed.
	60	☑		☑		Purpose groups and specialised housing is difficult to define. More guidance needed.
	82	☑		☑		Is a holiday let a house or other residential? BRE Global view is this is not a critique of MICT or D but possibly of Building use.
	121	☑		☑		B&B and Holiday cabins and HMO's. The example given, an inner room, should be picked up by the Building Control Body but the general point is clearly a 'modern building use' and some authorities having jurisdiction will want alternative exits and others may accept the use as taking to dwelling house. Purpose groups and specialised housing again to be flagged.
	139	☑		☑		Can there be a purpose group for student accommodation. When to use 1(a) and 2(b) is unclear. Why no definition of HMOs, what are Apart-hotels? BRE Global interpreted this as being... should one assume 1(a) or 2(b)? Also, BRE Global believes

						these are examples of modern building use and therefore need to be captured.
	93 (1)	☑		☑		The respondent identifies student accommodation and suggests designers are designing these as general purpose flats (purpose group 1). The respondent believes there should be firmer guidance on what purpose group must be used. The respondent believes single stair student blocks are inappropriate. Holiday flats, apart-hotels and Airbnb... are these examples of purpose group 2 uses or purpose group 1 uses?
	112 (4)	☑				In giving their opinion on B4 compliance the respondent provided a view of purpose groups and sub-groups that might suggest purpose groups in general should be reviewed.
	146 (V2:0)	☑				The respondent made a point regarding purpose groups and in particular purpose group 5 and whether healthcare buildings should/should not be purpose group 5 use. This suggests revision to purpose groups in appropriate.

Section 1: Fire detection and alarm systems

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Blocks of flats (1.10)	48 (1)				☑	The respondent's comment has been copied by BRE Global to introduction/section 0 to trigger under 0.14. In BRE Global's experience tall/large dwellings are frequently converted to a mix of HMOs and bed sits. Also, in BRE Global's opinion these buildings are subjected to material alteration(s). BRE Global concludes new guidance is needed on what to do if the building accommodates seven or more persons living as a household and/or also contains bed sit flats.
	59 (1)				☑	The respondent identifies the gap in guidance on specialised housing. Older people are staying in their homes longer therefore these 'uses' should not be considered akin to general needs housing.
	89 (1)				☑	The respondent believes detection/sounders in the common parts, linked to flats, can be a beneficial life safety feature. The respondent argues that the

						detector/sounders do not need to sound immediately if monitored remotely. This is a current 'state of affairs' and considered a temporary measure in some blocks of flats on account of some other shortfall in fire safety e.g. combustible cladding. Whilst it is not intended to become a long-term solution if all other fire safety features were compliant. If retained in guidance further thinking would be required.
	119 (1)				☑	The respondent considers evacuation alarms for Fire and Rescue Services constitute reasonable provision in High-Risk Residential Buildings.
	128 (1)				☑	The respondent acknowledges this paragraph states "[...] detectors in common parts[...] do not usually sound an audible warning." The respondent believes this is leading to confusion and misunderstanding. The suggestions to review stay put guidance such that under some circumstances if communal alarms actuate, they sound and all persons on that floor evacuate. This or consider evacuation alert (for Fire and Rescue Service use).
	129 (1)				☑	The respondent points out that some designs are now being received that show simultaneous evacuation. Detection/alarm is being provided in common parts. Can we review the wisdom of not remote monitoring detector/alarms in common parts in sheltered housing? Review of all this is needed.
	132 (1)				☑	The respondent suggests that if a building is combustible then compartmentation cannot be relied upon rendering stay-put a non-viable strategy. The respondent suggests that plasterboard protection to combustible walls is not a robust enough solution – fire will get into the structure. For the same reasons plasterboard clad walls forming protected shafts for stairs and plaster boarded ceilings to flat roofs (which might need to be traversed in event of a fire) are not acceptable. BRE Global's opinion is that rather than say plasterboard protection is at fault there seems to be a need to consider this more fully, and the Fire Investigation work that BRE Global conducts does suggest that if a fire gets into the walls and floors of combustible construction there is a greater likelihood of disproportionate damage occurring.
	135 (1)				☑	Building owners/management should be more 'tuned-in' to the need to provide some residents with 'inclusive' fire alarms e.g. flashing beacons and vibrating beds?

	139 (1)	☑		☑		The respondent is asking for more detail. Perhaps typical layouts indicating where detection should and should not go and what should and should not be interlinked would suffice. LaCORS is seen as a useful start document.
	142 (1)				☑	The respondent believes the fire detection and alarm in blocks of flats is not sufficient on its own and that there should be additional guidance on the subject of Evacuation alert systems (presumably to BS 8629:2019) for blocks of flats.
	149 (1)				☑	The respondent believes that fire detection and alarm arrangements in blocks of flats, initiating simultaneous evacuation, requires firm guidance now because this arrangement is now becoming more common/desired. BRE Global's observation is that communal detection systems installed to BS 5839-1 (Category L5 systems) to actuate fire safety features e.g. automatic opening vents or to signal some other fire safety feature are currently being 'extended' into flats. BRE Global considers what then will become of the installation to BS 5839-6 D2 LD3/LD2 in the flat proper? Also, when the communal system actuates, where should the pr-alarm notification go to and should the alarm go into full sounding mode on double knock? In BRE Global's opinion, these hybrid systems have been with us for nearly four years, accordingly it will be hard to undo the concept of hybrid systems.
	135 (5)				☑	The respondent makes the observation that when a stay put policy needs to be abandoned, the Fire and Rescue Service need access to an addressable alarm/sounder system, so as to initiate evacuation on some or all floors. This addressable alarm should be at Fire Service entry level.
Student accommodation (1.11)	94 (1)	☑		☑		The respondent believes the six person household 'flat' would need an LD2 fire detection and alarm installation. BRE Global's reading of section 1.1 is that LD3 systems seem to be being proposed. The respondent believes the better answer is to enhance the detection and alarm to LD1 and have the system remotely monitored.
	132 (1)				☑	The respondent uses previous arguments to suggest combustible construction is not appropriate for sheltered housing and student accommodation.
	139 (1)	☑		☑		The respondent is asking for more detail. Perhaps typical layouts indicating where detection should and should not go and what should and should not be

						interlinked would suffice. LaCORS is seen as a useful start document.
Sheltered housing (1.12)	132 (1)				☑	The respondent uses previous arguments to suggest combustible construction is not appropriate for sheltered housing and student accommodation.
	135 (1)				☑	Much more guidance on specialised housing needed. The common denominator being slow moving residents. The respondent believes refuges/lobbies/firefighting lifts all need to be considered for buildings having a fifth storey or floor >11m above Ground Level. Reference is made to the call alert system used in specialised housing. The suggestion is that communal fire alarms should be interlinked to central fire alarm and evacuation alert system - see BS 8629:2019. This would enable the Fire and Rescue Service to consider stay-put or phased or simultaneous evacuation. Note the respondent believes that addressable alarms should be a 'hard trigger' for all new build with a fifth storey or a floor >11m above Ground Level or residential buildings undergoing a Material Change of Use and for HMOs undergoing material alteration. The respondent suggests the need for there to be a dedicated and sufficiently well-appointed room at entrance storey (i.e. a protected space) available for the incident commander to operate from– this incident room would need the minimum of an addressable alarm panel and access to an evacuation alert system and the communication with the stair lobbies.

Section 3: Means of escape – flats

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Number of escape routes (3.27)	64 (1)	☑	☑			The respondent points out that the guidance for ventilation in stairs OVs and the requirement for AOVs in dead end corridors where the travel distance exceeds 4.5m is lacking in Diagram 3.8. The respondent points to BS 9991:2015 as providing better guidance.
	117 (1)	☑		☑		The respondent asks for the rationale of allowing 7.5m unvented dead end travel (shown in diagram 3.7) to be explained in the notes.

						The respondent observes diagram 3.8 allows 15m of travel distance towards a stair or 15m of travel distance towards a cross corridor door. The question posed is if the corridor was 30m long, with a stair at either end - would the corridor need sub division at approximately midpoint (15m mark)? Can this be clarified in the diagram.
	119 (1)				☑	The respondent considers the travel distance in single direction escape in blocks of flats is now pushing 30m+ and one was for up to 40m. The respondent also points out that by increasing the maximum travel distance to a single stair from 30m max to 40m will result in non-compliance with Part H: H6 guidance. Also in buildings with two stairs why is diagram 3.8(b) correct should the middle portion of a corridor to be acceptable unventilated. Lastly the dead end corridor in 3.8(c) should in the respondent's view be ventilated. Can these travel distances and mechanical ventilation questions be considered and new guidance provided?
	128 (1)				☑	The respondent points to this clause which states "[...] a single escape route is acceptable in either of the following cases:[...]." The suggestion is there should be a third criteria to limit he height at which single stairs are appropriate.
	134 (1)				☑	Diagrams 3.7a and 3.8c are conflicting with 3.7b and 3.8 b. there should be consistency. Dead ends <4.5m no ventilation. Dead ends up to 7.5m must be ventilated.
	135 (1)				☑	All dead end corridors, mid portion corridors and stairs to be vented. The respondent points out that AD B is confusing with vented and unvented options. If two lifts provided in a 'bank' or in a building, one must be a Fire-fighting lift. Consideration should be given to two-stage fire alarms so that occupants, unaffected by a fire, are alerted to the fire event. It should be their decision to stay or leave. An intermittent alarm could mean "be aware" and continuous alarm could mean simultaneous evacuation needs to occur. Travel distances must be based on the most realistic slowest moving resident. BRE Global observes this may be difficult to agree in advance. Further research would be required? Travel in dead end corridors and long corridors should both be researched. The respondent says that once maximum distances are set, they should become prescriptive hard triggers. Note BRE Global uses the expression 'hard triggers' to convey the respondent's wish for these to be prescriptive. The respondent believes hard triggers

						should not then be 'worked,' using BS 7974 or other, to create safe available egress times – which would allow longer travel distances. New or Material Change of Use flats or HMOs undergoing material alteration should have sprinklers installed. The provision of sprinklers should be another 'hard trigger' and not a reason to argue reduction in standard elsewhere. Fire break floors should be considered. Respondent believes these should be at intervals in high rise buildings e.g. at every 10 storeys. The respondent suggests a review of whether wet risers should be triggering at 50m or lower. Travel distances need a review. Distances should be based on capabilities and behaviour of the least mobile. BRE Global observation… How one would do this for a block of flats before the occupants are known is unclear, but a database of capabilities might need to be agreed by a committee. We need to review safe refuge design too. The respondent believes hoses will always run up the stairs from a lower bridgehead causing the doors between lobby and stairs to be open. Should diagram 15.1a be adopted as the new solution, it may be possible to fight a fire without running the hoses through the stairwell. Further research/liaison with the Fire and Rescue Service would be needed.
	86 (3)				☑	The respondent points to the 'tendency' to install fan coil units in common parts for comfort cooling because service runs in common parts often cause overheating problems. To capture this observation, BRE Global places it under 3.27 and or 7.4. Also Note 2 in Table B4 needs to be clear about these fan coil units NOT being allowed OR if applying precautionary principle then perhaps sprinklers should be installed in all common corridors and lobbies in case of retro fitting.
Small single stair buildings (3.28)	28 (1)	☑		☑		Small single-stair blocks of flats. Where flats on lower floors undergo material alterations e.g. forming open plan layouts. The thrust is that an internal protected lobby is a 'key fire safety feature' for the occupants of upper floor flats. Can guidance caution against removal of such key features?
	84 (1 & 3)	☑		☑	☑	The respondent observes that at the foot of a single stair building on the 'exit passage' there may be ancillary accommodation (incoming services, refuse stores, post rooms etc). To expect every ancillary space to be lobbied and ventilated is in the respondent's eyes unreasonable - are some areas low

						risk? BRE Global's view is this is a modern design 'pressure' but BRE Global believes the guidance is clear. Designers working on tight sites will need to lobby (Ventilated) such ancillary accommodation and manage the client's expectations regarding layouts. Note: The respondent suggests exit passageways need to be ventilated. This is not a design issue that BRE Global is aware of. It is the view of this respondent. Perhaps if review is conducted this can be added to the mix. If the door between a lobby and the stair can be removed (Diagram 3.9 (small single stair buildings) then de facto services will run 'in the stair'. Guidance needed on whether fire sealing is needed at every floor level of electric risers, gas risers, drainage and or water supply risers. Should the door to such riser be the same fire rating as the protected shaft and no longer 'half'- in and 'half'-out?
	134 (1)	☑		☑		The internal layout of flats in diagram 3.9b would go a long way to explain this.
	119 (1)				☑	The respondent wants to point out that many single stair buildings do go down the basement. Either the present guidance needs to be more robustly emphasised or additional consideration needs to lead to new guidance and other options.
Flats with balcony or deck access (3.29)	100 (3)	☑				Respondent would like to know if a balcony needs fire resistance. BRE Global notes paragraph 3.29 which deals with Flats with balcony or deck access and offers and either/or approach i.e. either use 3.27 in AD B or clause 7.3 of BS 9991. BRE Global suggests "may be modified" should be revisited if the intention was that Section 7.3 of BS 9991 was to be used. Also, why not copy the whole of 7.3 from BS 9991 into AD B?
Escape routes over flat roofs (3.30)	132 (1)				☑	The respondent suggests that if a building is combustible then compartmentation cannot be relied upon rendering stay-put a non-viable strategy. The respondent suggests that plasterboard protection to combustible walls is not a robust enough solution – fire will get into the structure. For the same reasons plasterboard clad walls forming protected shafts for stairs and plaster boarded ceilings to flat roofs (which might need to be traversed in event of a fire) are not acceptable. BRE Global's opinion is that rather than say plasterboard protection is at fault there seems to be a need to consider this more fully, and the Fire Investigation work that BRE Global conducts does suggest that if a fire gets into the walls and floors of

						combustible construction there is a greater likelihood of disproportionate damage occurring.

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Smoke control in common escape routes (3.49)	50 (1)	☑		☑		The respondent believes fire doors opening to smoke shafts are problematic because of installation errors when fitting the actuator. Can there be better guidance? The measurement of the free air area is not clear. BRE Global's observation is the measurement of the door's area should be straightforward by using diagram D1 in appendix D to determine width; and the method of determining height should be even more straightforward. Appendix D might also address how to measure the FAA of dampers or suggest appropriate BS EN guidance to follow. Note also, Appendix C refers to BS EN 12101-6 and perhaps further guidance from this standard should be included in the Appendix. BRE Global believes smoke shafts are a modern design the SCA guidance is not endorsed in AD B. Suggest this is all reviewed and i) guidance on the actuator and ii) how to measure the door area and safety grille FAA is all added to 3.51. If incorrectly designed and installed the intent of section 3.49 will not be achieved. So also highlight 3.51 and Appendix D.
	86				☑	The respondent is concerned about location of AOVs and conflicting (better?) alternative guidance from either BS 7346 or BCA guidance note 8. The whole piece needs reviewing.
	38 (1)			☑		The respondent's view is that currently inadequate regard is given to preventing smoke ingress into a single stair. BRE Global's view is that designers and AHJs go to the Smoke Control Association (SCA) guide for practical guidance. BRE Global notes the guide is not endorsed in AD B. There may be a case for further consideration of some of its themes (more work research).

	79 (1)				☑	The respondent believes the methodology for calculating FAA of various ventilators is problematic. The respondent asks if AD B can use Figure 28 in BS 9999?
	91 (1)				☑	The respondent believes the guidance in Appendix D (Diagram D5 [option b]) is leading to under sizing of ventilators. BRE Global agrees this is key guidance to satisfy a modern design. Smoke clearance and smoke management needs to be effective and reliable and the FAA of ventilators needs to be accurately determined. BS EN 12101-2 and 12101-8 are suggested for determining the FAA of vents and 'doors' into smoke shafts respectively. The respondent asks that doors opening to vent shafts should be replaced with dampers. The Smoke Control Association provides guidance. The respondent asks if the SCA guidance can be considered and endorsed.
	104 (1)				☑	Respondent says that AOVs on end wall of corridor may not be suitable on very tall buildings. BRE Global observes that research and guidance is needed. Note BS 9991 limits this to 30m.
	117 (1)	☑		☑		The respondent points to guidance of BS 9991, limiting the height at which AOVs can be installed on external walls (and be expected to operate in a fire event) to 30m. The respondent questions if the 0.5m and 2.0m dimensions from 3.51(b)(i) and suggests they are incorrect and warrants review.
	134 (1)				☑	Inlet and outlet air. There must be a minimum distance to prevent smoke being pulled back, down and into the building.
	67 (1)				☑	The respondent believes all AOVs should be supported by a Declaration of performance (DoP) to EN 12101-2 and be certificated and classified to BS EN 13501-4.
	102 (1)	☑		☑		The respondent points to the risk manually operated vents to (on external walls or to smoke shafts) being opened for comfort cooling. Suggestion is they could be open when a fire occurs and spread smoke. Also where vents sited on external walls they may allow smoke to re-enter on non-fire floors. The point made is that vents should be specified to BS EN 12101-2 . Guidance in 3.51(b)(iii) allowing Doors is incorrect and dampers to 12101-8 should be specified.
Smoke control in common	50 (1)	☑		☑		The respondent believes fire doors opening to smoke shafts are problematic because of installation errors when fitting the actuator.

escape routes- Natural ventilation (3.51)						Can there be better guidance? The measurement of the free air area is not clear. BRE Global's observation is the measurement of the door's area should be straightforward by using diagram D1 in appendix D to determine width; and the method of determining height should be even more straightforward. Appendix D might also address how to measure the FAA of dampers or suggest appropriate BS EN guidance to follow. Note also, Appendix C refers to BS EN 12101 - 6 and perhaps further guidance from this standard should be included in the Appendix. BRE Global believes smoke shafts are a modern design the SCA guidance is not endorsed in AD B. Suggest this is all reviewed and i) guidance on the actuator and ii) how to measure the door area and safety grille FAA is all added to 3.51. If incorrectly designed and installed the intent of section 3.49 will not be achieved. So also highlight 3.51 and Appendix D.
	102 (1)	☑		☑		Respondent points to the risk manually operated vents to (on external walls or to smoke shafts) being opened for comfort cooling. Suggestion is they could be open when a fire occurs and spread smoke. Also where vents sited on external walls they may allow smoke to re-enter on non-fire floors. The point made is that vents should be specified to BS EN 12101-2 . Guidance in 3.51(b)(iii) allowing Doors is incorrect and dampers to 12101-8 should be specified.
	86				☑	The respondent is concerned about location of AOVs and conflicting (better?) alternative guidance from either BS 7346 or BCA guidance note 8. The whole piece needs reviewing.
	79 (1)				☑	The respondent believes the methodology for calculating Free Air Area of various ventilators is problematic. The respondent asks if AD B can use Figure 28 in BS 9999?
	91 (1)				☑	The respondent believes the guidance in Appendix D (Diagram D5 [option b]) is leading to under sizing of ventilators. BRE Global agrees this is key guidance to satisfy a modern design. Smoke clearance and smoke management needs to be effective and reliable and the Free Air Area of ventilators needs to be accurately determined. BS EN 12101-2 and BS EN 12101-8 are suggested for determining the Free Air Area of vents and 'doors' into smoke shafts respectively. The respondent asks that doors opening to vent shafts should be replaced with dampers. The Smoke Control

						Association provides guidance. The respondent asks if the SCA guidance can be considered and endorsed.
	104 (1)				☑	The respondent says that AOVs on end wall of corridor may not be suitable on very tall buildings. BRE Global observes that research and guidance is needed. Note BS 9991 limits this to 30m.
	117 (1)				☑	The respondent points to guidance of BS 9991, limiting the height at which AOVs can be installed on external walls (and be expected to operate in a fire event) to 30m. The respondent questions if the 0.5m and 2.0m dimensions from 3.51(b)(i) and suggests they are incorrect and warrants review.
	146 (1)				☑	The respondent points out that there should be guidance regarding natural ventilation confirming whether there is a maximum height at which natural ventilation works; reliably.
	67 (1)				☑	The respondent believes all AOVs should be supported by a Declaration of performance (DoP) to EN 12101-2 and be certificated and classified to BS EN 13501-4.
	146 (5)				☑	The respondent asks whether further work is required on smoke extract from common stairs. Is 1.0m sufficient? BRE Global observes that this may be a subject which would benefit from review -latest practices/thinking.
Smoke control in common escape routes- Natural ventilation (3.53)	102 (1)	☑		☑		The respondent points to the risk manually operated vents to (on external walls or to smoke shafts) being opened for comfort cooling. Suggestion is they could be open when a fire occurs and spread smoke. Also where vents sited on external walls they may allow smoke to re-enter on non-fire floors. The point made is that vents should be specified to BS EN 12101-2 . Guidance in 3.51(b)(iii) allowing Doors is incorrect and dampers to 12101-8 should be specified.
	129 (1)				☑	The respondent points to this clause to ask why AOVs are not specified for blocks with two stairs. The respondent points to the smoke extract being of use during evacuation and suggests no resident is likely to open the OVs during evacuation. BRE Global's observation - if the corridor is full of (filling with) smoke then occupants of an adjacent flat(s) may decide to evacuate and get into difficulty in the corridor. Also, the Fire and Rescue Service may be delayed in their operations until the corridor ventilation is operated.
Smoke control in common	50 (1)				☑	The respondent says that smoke control dampers need to be more clearly described. The respondent believes there is confusion - dampers are being

escape routes- Mechanical ventilation (3.54)						specified and installed incorrectly. BRE Global's observation is that where a damper is described as a fire and smoke damper, the designer and regulator need to be clear on the mode of actuation and the performance of the damper in use i.e. The respondent suggests dampers be specified to BS EN 12101-8. BRE Global's view is that if designers and regulators are unsure dampers should be E or EI or EI(S) designation there is an issue to resolve.
	79 (1)				☑	The respondent says that paragraph 3.54 only refers to ventilation by pressure differentials. Can guidance in line with BS 7346-8 be considered. BRE Global notes the guidance by Smoke Control Association (SCA) is not endorsed in AD B. Suggest this is all reviewed. 3.49 will not be achieved. Highlight 3.54
	119 (1)				☑	The respondent considers the current guidance is lacking regarding the location of the corridor vent (smoke shaft). Can guidance be provided. Note the Smoke Control Alliance document is not even referenced in AD B. Guidance is urgently needed.
	128 (1)				☑	The respondent points to this clause and suggests more guidance is needed particularly on the location of the smoke shaft relative to the door into the stair.
	129 (1)				☑	The respondent points to this clause to ask if the door between the stair and the lobby should not have smoke seals. BRE Global observation is that mechanical smoke extract requires review and new guidance.
	134 (1)				☑	Pressurisation of stairs is exceptionally rare. Can the guidance refer to the Smoke Control Association Guide?
	67 (1)				☑	The respondent's comments are detailed and it is clear that the respondent believes section 3.54 is thin on important detail. The respondent wants designers specifiers and regulators to understand the importance of correctly designed and certified and commissioned systems. How much detail should go into AD B guidance? Subjects to include in review would be- i) Standards applicable, ii) Declarations of Performance and Certification for fans, ducts, smoke control dampers and where used as AOV (to be fire resisting). iii) Insulating performance of AOVs and ducts (not just integrity... never...in some circumstances).

						iv) Post construction validation of ducts for smoke tightness, v) Timber doors used as AOV (doors) natural vent only vi) Proof of performance of door-set with actuator. vii) Supply duct sizing routing (clean air) maximum length of duct. In summary, the question seems to be can revision to AD B do the subject justice? How can the key points be disseminated to industry?
	102 (3)				☑	The respondent makes the point that guidance is lagging behind the standards for ductwork. This respondent and respondent 67 provide a detailed critique of ductwork standards which in their opinion needs review.
	73 (5)				☑	The respondent raises the point here under B5 but it is a B3 issue being raised. The respondent believes more guidance is needed on smoke control by mechanical ventilation.

Section 5: Internal fire spread – dwellinghouses

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Provision of cavity barriers (5.18)	135			☑		Seeks more definitive guidance on cavity barriers between modules of pods and volumetric modular construction (see Design for Manufacture and Assembly (DfMA) and MMC work).
	131 (3)				☑	The respondent provided detailed drawings which can be considered, to convey the point that Diagram 8.1 has become outdated and too general. Diagram 8.1 needs to become several diagrams- masonry:masonry, curtain walls running past slab, open rainscreens running past slab and concrete panel with internal insulation and concrete panel refurbishments. The diagrams also need to show how to accommodate bracketry and rails. All forms of cavities (including extensive ones above non demountable ceilings and possibly walls of large 'penthouse' type flats) should be considered in any new section.

						BRE Global's observation - the number of comments on paragraph 8.2 and diagram 8.1 and the double mention of cavity barriers in section 5 and section 8 suggests a new Schedule 1 functional requirement 'cavities, cavity barriers and fire stopping' is needed (shunt B4 to B5 and B5 to B6?)
	44 (3)				☑	The respondent says Note 3 in Diagram 5.3 (to which paragraph 5.18 refers) allows cavity insulation of any classification. The respondent is concerned that the detailing around windows and doors and at heads of walls is not well enough executed on site to allow insulation of class B, or 'worse', to be used.
	51 (3)				☑	This is a new item because to untangle all references to cavities and cavity barriers throughout the document would require re-working of current guidance. This respondent is asking for better guidance on cavity barriers and where they are needed.
	108 (3)				☑	The respondent believes diagram 8.1 is helpful but asks could there be a similar version for dwellinghouses? BRE Global considers that provision of cavity barriers in houses is not that well understood. The subject is very broad though. Perhaps there could be a dedicated section in AD B?
	143 (3)				☑	The respondent points to the need to provide cavity barriers around openings and then considers full height glazing. The respondent says that within a zone barely taller than the thickness of the floor slab is the head of one window the cill of the next and the compartment floor. This means three barriers in a tight area. Can there be alternative guidance where this occurs? Also consider termination points for kitchen extracts (usually). Guidance on vent ducts 'exit points' needs more thought. Where a slimline duct exits the compartment, via the cavity wall, one would expect cavity barriers to close the opening. The location of these ducts close to slab soffit means they will run through the external wall in a congested zone of bracketry. The respondent suggests the ducts should be specified to need a damper at this point?
Construction and fixings for cavity barriers (5.20)	71 (3)				☑	The respondent believes in very tall buildings cavity barriers should have higher performance than 30:15 E:I. BRE Global observes the theoretical point being made that fire could pass several floor levels in less time than by passing through compartments. The question

						asked is the appropriateness for such a low E:I as 30:15 in very tall buildings?
	143 (3)				☑	The respondent asks that the guidance on open state cavity barriers is clarified. Also what does "[...] so their performance is unlikely to be made ineffective [...] a) during a fire [...]" mean with respect to open state barriers against lightweight cladding panels that may melt and de-laminate in a fire?
Construction and fixings for cavity barriers (5.21)	57 (3)	☑		☑		This respondent believes cavities in dwellings focus too much on cavities in external walls. Can there be guidance on cavities and barriers in internal construction.
	71 (3)			☑		The respondent makes the point that this section should be reviewed in favour of tested details?
	80 (3)			☑		The respondent makes the point that 38mm timber and 0.5mm steel may not achieve 30:15 E:I performance. BRE Global notes previous respondent saying generic solutions should be reviewed in favour of tested details?
	119 (3)	☑		☑		The respondent says section 5.21 is at odds with diagram 5.3. Can the diagram or guidance of 5.21 be reviewed? BRE Global observation. The 'seal' achievable using SITE APPLIED timber may be questionable on 'day one'. It may be more questionable if it has shrinks across the grain. The seal may be yet further questionable if it suffers from rot. Thin steel (0.5mm thick) may move at joints. A consideration might be: what happens at reveals where timber and plasterboard meet with a straight line and the line is also part of the 'cavity barrier'. Can straight joints be acceptable? Suggestion therefore is to revise guidance of 5.21 to check it is still relevant and acceptable.
	131 (3)	☑				The respondent makes the point that saying "These do not necessarily achieve the performance specified in paragraph 5.20" is not good enough. The respondent says 5.21 needs review and firm guidance.
	143 (3)	☑		☑		The respondent says it is now inappropriate to allow general statements on materials that may not achieve the performance specified. Paragraph 5.21 should be

						revised or removed in favour of tested materials in tested situations.
Construction and fixings for cavity barriers (5.23)	45 (3)	☑		☑		This respondent points to the need for more detailed guidance on building movement pre and during a fire. BRE Global thinks paragraph 5.23 (a) is appropriate.
	71 (3)	☑		☑		The respondent points out that there should be cavity barrier tests for intended end use applications e.g. floor to cladding. Tests following standard linear gap seal testing regimes (against concrete) are not in the respondent's view appropriate.
	86 (3)				☑	The respondent points to open-state cavity barriers as being problematic and that they cannot be tight fitting. The respondent says they are tested between concrete 'lintels' and not tested in an end-use realistic configuration e.g. against lightweight cladding. The respondent goes on to contend that ASFP TGD 19 must be peer reviewed even though this has been an 'approach' for some time. The respondent suggests the 'work-around' for time to sealing the gap to BS 476 or EN 1363 within an 'acceptable' limits must be peer reviewed.
	112 (3)				☑	The respondent points to the testing of open-state cavity barriers as being problematic and that they cannot be tight fitting. The respondent says they are tested between concrete 'lintels' and not tested in an end-use realistic configuration e.g. against lightweight cladding. Can test standards BS EN 1366-4, 1363-1, CEN/TS1187 and EN 13501-5 be reviewed?
	143 (3)				☑	The respondent asks that the guidance on open state cavity barriers is clarified. Also what does "[...] so their performance is unlikely to be made ineffective [...] a) during a fire [...]" mean with respect to open state barriers against lightweight cladding panels that may melt and de-laminate in a fire?
	87 (4)			☑		The respondent asks whether there can be guidance on appropriate testing regimes for cavity barriers which seal the void behind curtain walls and unitised facades.
Openings in cavity barriers (5.24)	143 (3)				☑	The respondent says this guidance is out of date because in a rain screen construction there will be bracketry and rails that interrupt cavity barriers. Can there be diagrams i.e. do's and don'ts in terms of penetrations of cavity barriers.

	149 (3)				☑	The respondent points to the need for guidance on pipe penetrations of external walls and 'trimming' the opening in an external wall (which may not need fire resistance) to close the cavity. This needs more guidance.

Section 7: Compartmentation/sprinklers – flats

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Sprinklers (7.4)	122 (3)	☑		☑		The respondent says that for new-build the 11m threshold is clear. The guidance should be firm on material alterations. The developer, intent on re-modelling a third floor and adding another storey (loft conversions) will be unaware of the implications to sprinkler throughout. The guidance needs to be firm to help the regulators enforce this 'life' safety requirement. The respondent also asks if watermist systems are allowed yet?
	24 (3)				☑	The respondent points out that sprinklers could be omitted above prior to the new height trigger for them. The respondent believes they may be omitted 'justified out'. The respondent BRE Global believes is pushing for Sprinklers to be a 'Hard Trigger' like cladding a >18m only being justified by reference to BS EN classifications to A1 or A2.
	27 (3)				☑	The respondent says fires can spread to common parts and thinks the guidance in 7.4 and in Table B4 (item 2) is wrong.
	37 (3)				☑	This respondent acknowledges the reduction from 30m to 11m but wishes for there to be contextual guidance and commentary (engineering principles) as to why the reduction was introduced. The respondent understands the change is not to solve a structural problem and is seeking to rescue fire and smoke spread. Accordingly the respondent wishes for more guidance for sprinklers in Ground Floor accommodation e.g. shops which will be fully separated from the residential floors above.

	60 (3)				☑	The respondent points out that previously, the footnote 2 to Table A2 of the 2006 edition (as amended up to 2013) showed sprinklers had to be installed THROUGHOUT a building. The new guidance in 7.4 suggests if the common parts are sterile (with on definition of sterile) then sprinklers are not needed there. The respondent also points out that if the building was mixed use they would be looking at a BS EN 12845 installation throughout until 7.4. The respondent is asking for clarity on 'throughout' or 'not throughout' and mixed use (with compartment floors) Does this mitigate against the need for sprinklers 'throughout'?
	81 (3)				☑	The respondent makes a case for watermist and wider acceptance of BS 8458 and BS 8489 as appropriate watermist standards. BRE Global notes the respondent's point that there are over 70 references to sprinklers. If 7.4 (and other sections) were re-titled from sprinklers to water suppression it would likely involve consideration as red.
	84 (3)				☑	The respondent seeks further guidance. The respondent asks for clarity where a four-storey building is having a loft converted to accommodate an additional 4th floor. Question: do sprinklers need to go into all other flats from ground to new and including the new 4th floor? Or not? Also can it be made clear that even if there is a commercial use on the ground floor with compartment floor separating it from flats above that once the residential portion is extended to include a new 4th floor that a sprinkler installation is then needed in the commercial space too (BS EN 12845?) Or not.
	86 (3)				☑	The respondent points to the 'tendency' to install fan coil units in common parts for comfort cooling because service runs in common parts often cause overheating problems. To capture this observation, BRE Global places it under 3.27 and or 7.4. Also Note 2 in Table B4 needs to be clear about these fan coil units NOT being allowed OR if applying precautionary principle then perhaps sprinklers should be installed in all common corridors and lobbies in case of retro fitting.
	108 (3)				☑	The respondent says that there should be options rather than sprinklers alone e.g. mist.

	119 (3)				☑	The respondent asks can all forms of automatic fire suppression be considered and not just sprinklers?
	135 (3)				☑	The respondent says that automatic fire suppression should be the baseline for all new and Change of Use residential buildings. The requirement should trigger as a 'consequential improvement' and go hand in hand with significant 'material alterations'. This change in rules would turn the 'bar' that currently exists Regulation 4(3) the 'no worse than before' principle on its head. The respondent cites lobbying/influence by the London Assembly, the Building Regulations Wales and Review Panel Building Standards Scotland, Association of British Insurers and others that sprinklers must become the baseline.
	142 (3)				☑	The respondent asks "what about watermist?"
	56 (4)	☑		☑		The respondent asks for a heading for material alterations, where a building had a floor <11m above Ground Level and an additional storey is being added. Is it expected that the pre-existing flats will be sprinklered?
	125 (4)				☑	The respondent specifically refers to the sprinklering of 'common situation' buildings at a lower threshold.
	134 (5)				☑	The respondent asks if there could be much better guidance on systems and crossover of systems. The respondent asks if there can be situations where domestic sprinklers to BS 9251 might be expected to be 'extended' to cover small/medium retail space or communal areas in blocks of mixed use flats. When must systems to BS EN 12845 kick in?

Section 8: Cavities – flats

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Cavities- flats (8.1)	59 (3)	☑				The respondent asks that the cavity barrier diagram be brought up to date to include cavity barriers in cladding.

Provision of cavity barriers (8.2)	11 (3)	☑		☑		The Respondent believes the Diagram 8.1 is not relevant to modern construction. Requires another diagram reflective of multi-level buildings with storey height unitised facades.
	112 (2)	☑		☑		The respondent is asking that where buildings do not have to follow 7(2) and where the designer is at liberty to use material other than A1 or A2 in the walls that it is important to close all openings. the respondent goes on to say that all penetrations internal walls and floors should be 'closed ' with cavity barrier material.
	80 (3)	☑		☑		In BRE Global's opinion, the respondent is making a general case for diagram 8.1 to be updated to show where fire stop ends and cavity barrier begins at slab edge.
	86 (3)	☑		☑		The respondent asks about a detail where a party wall meets the inner skin of the external wall (typically Steel Framed wall System (SFS). The respondent asks if it can be made clear that the party wall should continue to the outer face of the SFS inner leaf? Otherwise, the SFS constructed inner leaf locally becomes 'the party wall' and needs 60min fire rating from each side separately. BRE Global believes the point might be covered if there was to be a revision to detailing in Diagram(s) 8.1?
	88 (3)	☑				This respondent supplies rainscreen cladding and insulated render systems. The respondent is unclear on the different application of cavity barriers and fire stopping.
	97 (3)	☑				This respondent supplies mineral fibre in rigid form that is used as a cavity barrier or fire stopping. There is confusion as to what the performance requirements are on a job by job basis e.g. should it be 30:15 E:I or 60:60 E:I? The respondent is asked for products to close cavities in the walls of modular buildings and has no test method to confirm their products will work. The respondent points out that they are unable to confirm the need for cavity barriers between modules in volumetric construction. Needs clarity. Cited diagram 33 but Diagram 8.1 will not, in its current form, answer these questions.
	131 (3)				☑	The respondent provided detailed drawings which can be considered, to convey the point that Diagram 8.1 has become outdated and too general. Diagram 8.1 needs to become several diagrams - masonry: masonry, curtain walls running past slab, open rainscreens running past slab and concrete panel with internal insulation and concrete panel refurbishments.

						The diagrams also need to show how to accommodate bracketry and rails. All forms of cavities (including extensive ones above non demountable ceilings and possibly walls of large 'penthouse' type flats) should be considered in any new section. BRE Global observation - the number of comments on paragraph 8.2 and diagram 8.1 and the double mention of cavity barriers in section 5 and section 8 suggests a new Schedule 1 functional requirement 'cavities, cavity barriers and fire stopping' is needed (shunt B4 to B5 and B5 to B6?)
	87 (4)	☑				The respondent points to a matter which is being interpreted differently by the regulator and warranty providers. It relates to voids in balconies and the question being asked is if these can be ignored if they are forward of the building (i.e. 'unlikely' to be making contact with the facade?
	51 (3)				☑	This is a new item because to untangle the references to cavities and barriers throughout the document would require re-working of the guidance. This respondent is asking for better guidance on cavity barriers and where they are needed. In BRE Global's opinion Diagram 8.1 could be made more 'modern' to reduce the 'problems'
	100 (3)				☑	The respondent says the guidance eon cavity barriers and modular construction is not clear enough and needs to be so.
	108 (3)				☑	The respondent says that there should be options rather than sprinklers alone e.g. water mist.
	112 (3)				☑	The respondent points to the testing of open-state cavity barriers as being problematic and that they cannot be tight fitting. The respondent says they are tested between concrete 'lintels' and not tested in an end-use realistic configuration e.g. against lightweight cladding. Can test standards BS EN 1366-4, 1363-1, CEN/TS1187 and EN 13501-5 be reviewed?
	122 (3)				☑	The respondent says there is still lack of understanding as to what is required at the facade/compartment floor interface. Is it a 30:15 barrier or a 90:90 fire stop? This relates to Diagram 8.1 really.
	132 (3)				☑	The respondent believes the intent of all of section 8 cannot be achieved in combustible construction. BRE Global places the point in 8.2 (rather than every paragraph) as this refers to diagram 8.1. If combustible construction is to remain an option then

						would be a completely reworked and bespoke section on combustible construction.
	143 (3)				☑	Regarding Diagram 8.1. The respondent is concerned that that this diagram needs urgent revision to make modern and mirrors comments of respondent 131. The respondent points to modular volumetric and asks for urgent clarification as to where the barriers are required. There is a concern that it will be impossible for post installation inspection of cavity barriers in modular construction.
	144 (3)				☑	BRE Global interprets the respondent's points to be that diagram 8.1 needs to be re-worked to give guidance on curtain wall and rain screen systems. The respondent points to curtain wall product standard BS EN 13830 to ask for more guidance on cavity barrier design. The respondent believes curtain walls have multiple cavities within the framework and asks if some cavities can be ignored if very small or 'bound'. The respondent asks for guidance where windows in curtain walling can run slab to slab. The respondent says that without guidance the regulators impose personal views and there is no consistency. Could aluminium of a specific thickness be a cavity barrier? If so could aluminium be accepted without further performance testing- if performance testing could be agreed. The respondent says there is no performance test. With curtain walls, the full height cavity could be 500 to 800mm wide. Guidance on the cavity between the principal envelope and the curtain wall and on long horizontal cavities (transome sections) is needed.
	63 (4)				☑	This respondent points to the need for more guidance on complex facades with complex geometries (BRE Global contemplates this may mean the respondent wants guidance on... say... curved facades, leaning facades and facades with various degrees of 'adornments') and multiple voids. What is and is not required?
	65 (4)				☑	This respondent points to the need for more guidance on complex facades with complex geometries and multiple voids. What is and is not required regarding cavity barriers in mullions?
	78 (4)				☑	This respondent points to the need for more guidance on complex facades with complex grids, sub-grids and multiple voids. What is and is not required regarding cavity barriers and their INSTALLATION?
	115 (4)				☑	B4 guidance refers back to B3 and section 8. Paragraph 8.2 refers to diagram 8.1. The respondent

						believes diagram is not 'modern' enough. Diagram 8.1 needs to become diagrams 8.1(a); (b); (etc)
Pathways around fire-separating elements-Junctions and cavity closures (8.3)	113 (3)	☑				The respondent would welcome more annotated diagrams showing what is and is not acceptable within protected shafts. The respondent would welcome more annotated diagrams on where cavity barriers and cavity closers are required.
	131 (3)				☑	The respondent provided detailed drawings which can be considered, to convey the point that Diagram 8.1 has become outdated and too general. Diagram 8.1 needs to become several diagrams - masonry: masonry, curtain walls running past slab, open rainscreens running past slab and concrete panel with internal insulation and concrete panel refurbishments. The diagrams also need to show how to accommodate bracketry and rails. All forms of cavities (including extensive ones above non demountable ceilings and possibly walls of large 'penthouse' type flats) should be considered in any new section. BRE Global observation - the number of comments on paragraph 8.2 and diagram 8.1 and the double mention of cavity barriers in section 5 and section 8 suggests a new Schedule 1 functional requirement 'cavities, cavity barriers and fire stopping' is needed (shunt B4 to B5 and B5 to B6?)
	149 (3)				☑	The respondent points to the need for guidance on pipe penetrations of external walls and 'trimming' the opening in an external wall (which may not need fire resistance) to close the cavity. This needs more guidance.
	56 (4)				☑	The respondent says that the cavity closers for masonry: masonry walls should be non-combustible. The respondent believes without such barriers, a fire may enter a cavity and spread through wall voids.

Section 10: Resisting fire spread over external walls

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	

Intention-Resisting fire spread over external walls	84 (3)				☑	The respondent uses the example of section 3.63 to highlight problems with 're-entrant' angles and how fire can spread from one compartment to the next across a ‘re-entrant’ angle via windows. If the windows serve different compartments the fire spreads quickly. BRE Global observes investigating two fires where fire spread because of a similar concept. See outcome of this in BS 9999 under 'Fully enclosed or partially enclosed courtyard spaces.' Test fit is B4 not B3.
	32 (4)				☑	The respondent states that the whole B4 section needs complete re-write but offers no explanation of specific issues.
	46 (4)				☑	The respondent states that the whole B4 section needs complete re-write but offers no explanation of specific issues. However like respondent 32 this was close to being discounted as a 'justified' criticism.
	60 (4)				☑	The respondent asks is there an acceptable and an unacceptable level of external fire spread? BRE Global notes the BS 8414-1: 2020 and -2: 2020. BRE Global believes this respondent's comment is valid if they believe the test is defective.
	93 (4)				☑	The respondent suggests new consideration should be given to composite plastic fencing and patio decking which could affect means of escape and spread fire into houses. See Fire Investigation case.
	100 (4)				☑	The respondent asks that we consider the fire load in modern buildings associated with goods and thermal insulation of the roof, walls and floor elements. The respondent asks if we need a fundamental rethink on periods of fire resistance and fire intensity as a result?
	101 (4)				☑	The respondent believes the 18m threshold (six floors above ground storey) should trigger at three floors above ground.
	143 (4)				☑	There should be emphasis on downward fire spread. The respondent cites Lakanal House. BRE Global investigates fires and there have been several in the last 24 months where downward fire spread has been apparent
Introduction (10.1)	135 (3)				☑	The respondent believes at present (because of Regulation 7(2) timber cannot play a part in the construction of external walls of tall residential buildings. The respondent believes there should be more research into the use of mass timber in buildings and how sprinklers may facilitate their use.

	125 (4)				☑	The respondent believes it would be more practical to consider 'volume of combustible material' per unit area of facade.

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
External surfaces (10.5)	17 (4)	☑	☑			The respondent asks if Diagram 40 could be reintroduced? The European classifications are difficult to understand but the diagram was useful.
	28 (4)				☑	Do timber treatments, applied to improve reaction to fire performance, need to be re-applied? Guidance needed on UV degradation and weathering. Ongoing controls to be dealt with under management of premises.
	34 (4)				☑	The respondent says that it cannot be right for buildings <18m tall to have 'no provision' in Table 10.1. The 'no provision' is at odds with the Schedule 1 relevant requirement. BRE Global believes this might be intended to mean 'determine performance on a case by case basis'.
	37 (4)				☑	The respondent asks if table 10.1 is acceptable to recommend 'no provisions'? BRE Global believes this might be intended to mean 'determine performance on a case by case basis
	92 (4)				☑	The respondent suggests if timber is treated to improve its fire performance classification (e.g. from Euroclass D to B) then there needs to be a date for re-coating - hence the need for 'ongoing controls'. The respondent also suggests that various treatments (papers, pastes mastics etc) which claim to improve an element's fire performance characteristics or a system's overall fire resistance should be proven to remain effective once 'aged'. Link with Regulation 7?
	93 (4)				☑	The respondent asks if table 10.1 is acceptable to recommend 'no provisions'? BRE Global believes this might be intended to mean 'determine performance on a case by case basis'
	115 (4)				☑	The respondent says paint finishes on metals are just not being tested to BS EN 13501-1. BRE Global

						notes there may be a link here to the work of the construction products regulator. Construction products (including different pain finishes) should be tested to the standards applicable (including BS EN 13501).
	119 (4)				☑	The respondent points to the guidance in table 10.1 and suggests 'no provisions' is at odds with the relevant requirement at paragraph 10.1.
	131 (4)				☑	The respondent points out that Note 1 says all materials must comply but notes Regulation 7(3) disapplies many items from the Regulation 7(2) 'requirement'. BRE Global observes that Regulation 7(3) says window frames (not windows) and glass do not need to achieve A1 or A2-s1,d0 and nor do door frames and doors. BRE Global wonders, what about glass in doors? The respondent points out that there needs to be a debate on laminated glass in windows and on balconies in balustrades. BRE Global observes that an interpretation of Table 10.1 for the [non] 'relevant buildings' is that they still need windows and doors to achieve B or C for the glass and membranes and electrical installations etc. The respondent is suggesting 10.5 and 10.6 and Table 10.1 need clarification.
	132 (4)				☑	The respondent is strongly of the opinion that the guidance of 'no provisions' for buildings of combustible construction, with a top storey at less than 18m above Ground Level, is seriously flawed. The respondent believes this needs review.
	135 (4)				☑	The respondent confirms previous advice, given to Government under the consultation 'Review of the ban on the use of combustible materials in and on the external walls of buildings including attachments'. That advice included making (plasterboard, sheathing, outer-skins of rainscreens, spandrels, 'significant' material in balcony constructions and brise soleil) all subject to the 'ban'. The advice also acknowledged that the structure of buildings should be exempt from the ban [on the understanding further research was still going to be conducted - e.g. Needs for Total Fire Engineering of Mass Timber Buildings - constructed from structural timber]. The trigger height should have been 11m not 18m, with ongoing research into the height threshold and risks. BRE Global notes the contrast of this response to respondent 132 on combustible structures.

						The respondent's current observations include looking again at specified attachments etc - what can and cannot be exempted? BRE Global notes this strays to Regulation 7(3) which is outside the scope of the project but some of the 10.15 considerations are relevant. The respondent points to: i) the need to work with industry, particularly where guidance is produced; e.g. the joint guide produced by the Society of Facade Engineers and the Centre for Windows and Cladding Technology. The guide was produced to provide members with practical solutions to Regulations 7(2) and (3) and AD B paragraph 10.15. ii) avoid blanket bans of one product type but keep the research going to capture new materials. iii) the number of balcony types are many and varied. The respondent suggests referencing BS 8579 and providing diagrams in AD B to aid understanding. iv) look again at membranes. The respondent points to a concern that temporary solutions are building-in unknown risks to modern construction. BRE Global observes, the ban could be affecting Part C and possibly Part L compliance. v) more advice needed on curtain walls do's and don'ts including thermal breaks and the whole issue of glazing and laminated glass. vi) The primary structure should be 'exempt' from Regulation 7(2) as it will be assumed to be 'protected' en route to complying with B3 and B4. vii) clarify thermal breaks and curtain wall requirements (including guidance on spandrels and opaque glazing) and continue testing and experimenting. viii) blinds within glazed units of external walls. ix) Damp Proof Courses and membranes in masonry:masonry walls and masonry:cold-rolled metal-framed wall systems needs review. x) small items: washers, spacers, weep holes lightning conductors rainwater goods all needs to be clarified. xi) can there be a temporary relaxation to regulation 7(2) (BRE Global notes this is Not Part B) to allow further consideration of membranes etc. xii) the 'exemption from Regulation 7(2) for waterproofing material underground is good but could the exemption extend to stepped 'tanking' detailing? If so, the stepping on sloping sites may need to be of the order of 600mm high above Ground Level.

	139 (4)				☑	The 'no provisions' requirement for buildings with a floor at 18m above Ground Level seems wrong.
	143 (4)				☑	The respondent says there should be a minimum requirement for 'other buildings' with a storey at <18m above Ground Level and >1.0m to a boundary. The respondent believes 'no provisions', in Table 10.1 cannot be right? The respondent would like to see the 'exemptions' of regulation 7(3) captured in Table 10.1 too. The respondent asks for clarification on what constitutes the 'outermost external material' where a composite material is being considered.
Materials and products (10.6)	80 (4)	☑		☑		The respondent believes paragraph still needs to be re-written. BRE Global understands the purpose of Regulation 7(2) is to emphasise the mandatory nature. Accordingly the respondent may be satisfied if the word 'should' be substituted for something expressing the mandatory requirement e.g. 'must' AND that at the end of the paragraph it states Paragraph 0.9 does not apply to this single paragraph.
	143 (4)	☑				The respondent points to this paragraph (the old paragraph 12.7) as still causing much disquiet in the industry. The respondent points out that the paragraph remains ambiguous. On issue is where the bracket ends in the first sentence. The respondent writes that the paragraph should be clear that it does not apply to 'relevant buildings'. BRE Global notes perhaps the paragraph was intended to apply to '...all materials used in the construction of an external wall (as defined in Appendix A)...but not including X Y or Z, should achieve the fire performance classification given in Table 10.1'. The respondent suggests the section should be set out with guidance for relevant buildings (start to finish) kept separate from the requirements for 'other' buildings.
	88 (4)				☑	The respondent says their business is having difficulty getting insulated render systems (to defined standard EAD 040083-00-0404) accepted. BRE Global cannot determine if the respondent's comment relates to systems on buildings >18m or <18m above ground. If greater than 18m then this perhaps spells out the need for clearer guidance in AD B (i.e. in paragraph 10.6 specifically). Perhaps the paragraph needs to connect with Regulation 7(2). BRE Global observes the ONLY route to compliance (where the building falls under regulation 7(4) is for all

						elements to be classified as A1 or A2-s1,d0 and paragraph 0.9 does not apply in this instance). The respondent points out that plastic corner beads should be exempted under Regulation 7(3). Review insulated render systems to see if there can be clarity going forward.
	107 (4)				☑	The respondent does not agree with either the prescription of Regulation 7(2) or the guidance of paragraph 10.6. The respondent believes every wall type should be tested large-scale to BS 8414-1 (or 2):2020 to determine suitability.
	109 (4)				☑	The respondent points to difficulties in complying with current Regulation 7(2) requirement: i) Terraces and inset balconies costly/difficult to achieve with non-combustible insulations. ii) EDPM seals (typically European class E) between windows and innerskin sheathing are vital for waterproofing. iii) Typical Vapour Control Layers are less expensive but have a lower classification than class B (and they are sandwiched between A1/A2 material). iv) Laminated glass balustrades should be reconsidered. The safety from falling must have higher 'status'. If balcony is A1 or A2 will the laminated glass alone give rise to fire spread risk? v) Much more work is needed on what is and is not acceptable with regards to thermal breaks. The respondent stated that there was a thermal break product available on the market that could achieve a 2hr integrity and insulation rating. vi) How to resolve mullion voids. BRE Global's observation seems to suggest if an assembly can be proven by test can that be an alternative to blanket A1 and A2 compliance.
	110 (4)				☑	The respondent addresses Regulation 7(2) and 7(3) as needing review. BRE Global notes this lies outside the scope of this project. The respondent believes Regulation 7(2) provides a 'deemed to satisfy' route. However, BRE Global notes the mandatory 'intent' of 7(2). The respondent suggests they would like for there to be an alternative route using BS 8414. BRE Global notes there is no such 'alternative route' where a floor is at >18m but there can be for a building with a floor at <18m. See comment at end relating to paragraph 0.9, which might clarify matters. The respondent mentions:

						i) That walls built using A1 and A2 could fail a BS 8414 test if suitably badly built. ii) A diagram would assist with understanding of 10.15, showing walkway/decks, terraces or roof gardens and if any could be considered not to be a specified attachment? The respondent seeks clarity on interpreting when is a wall not a wall - specifically a roof-side parapet upstand. Is it exempt from the requirement to be constructed from A1 or A2 material? The respondent seems to be suggesting a diagram would help understand what can/cannot be done with DPCs in different wall build-ups and a 'table' would be useful to consider a hierarchy of risk in buildings with different wall constructions.
	111 (4)				☑	The respondent is critical that spandrels and side panels cannot be glazed in laminated glass. BRE Global observes that Regulation 7(3) disapplies window frames and glass from the need to comply with Regulation 7(2). The guidance of AD B 10.15d is for laminated glass in spandrels and infills to comply with Regulation 7(2). The respondent asks if this could be reviewed believing an alternative, toughened glass, is unsuitable. The respondent believes toughened glass presents a danger with panes potentially 'falling-out' or 'exploding,' as a result of nickel sulphide inclusions. The respondent asks that this Part K danger is weighed against the risk/likelihood of laminated glass being a significant mechanism for fire spread. The respondent then asks a similar question regarding laminated glass in balustrades on balconies on buildings >18m tall. BRE Global notes that there is now one glass balustrade design that complies... perhaps other systems are in development? The counter argument is that toughened glass is not as safe as laminated or that no further systems are in development.
	126 (4)				☑	The respondent asks for clear guidance on: i) spandrels which now cannot be glazed in ordinary laminated glass. The respondent asks if there could be guidance on spandrels. ii) balustrade infills, the respondent believes a re-think of the laminated glass 'ban' is needed as toughened glass presents a danger as it has no inherent 'post breakage capacity'. iii) the guidance in Table 10.1 says there are no minimum requirements. This should be addressed.

						BRE Global's view is that the guidance may have intended saying something like "...each case on its merits" rather than imply that no fire performance is needed. iv) thermal breaks. What is intended?
	131 (4)				☑	The respondent says this paragraph is still not clear. The respondent says it can be interpreted as '...all components except...' or '...only the specific components listed'. It is noted this is the old 12.7 with the title changed - omitting use of word insulation. BRE Global believes to make this clearer, perhaps the guidance should be placed under headings Relevant Buildings and a separate heading All Other buildings .
	135 (4)				☑	The respondent confirms previous advice, given to Government under the consultation 'Review of the ban on the use of combustible materials in and on the external walls of buildings including attachments'. That advice included making (plasterboard, sheathing, outer-skins of rainscreens, spandrels, 'significant' material in balcony constructions and brise soleil) all subject to the 'ban'. The advice also acknowledged that the structure of buildings should be exempt from the ban [on the understanding further research was still going to be conducted - e.g. Needs for Total Fire Engineering of Mass Timber Buildings - constructed from structural timber]. The trigger height should have been 11m not 18m, with ongoing research into the height threshold and risks. BRE Global notes the contrast of this response to respondent 132 on combustible structures. The respondent's current observations include looking again at specified attachments etc - what can and cannot be exempted? BRE Global notes this strays to Regulation 7(3) which is outside the scope of the project but some of the 10.15 considerations are relevant. The respondent points to: i) the need to work with industry, particularly where guidance is produced; e.g. the joint guide produced by the Society of Facade Engineers and the Centre for Windows and Cladding Technology. The guide was produced to provide members with practical solutions to regulations 7(2) and (3) and AD B paragraph 10.15. ii) avoid blanket bans of one product type but keep the research going to capture new materials. iii) the number of balcony types are many and varied. The respondent suggests referencing BS 8579 and providing diagrams in AD B to aid understanding.

						iv) look again at membranes. The respondent points to a concern that temporary solutions are building-in unknown risks to modern construction. BRE Global observes, the ban could be affecting Part C and possibly Part L compliance. v) more advice needed on curtain walls do's and don'ts including thermal breaks and the whole issue of glazing and laminated glass. vi) The primary structure should be 'exempt' from Regulation 7(2) as it will be assumed to be 'protected' en route to complying with B3 and B4. vii) clarify thermal breaks and curtain wall requirements (including guidance on spandrels and opaque glazing) and continue testing and experimenting. viii) blinds within glazed units of external walls. ix) damp proof courses and membranes in masonry:masonry walls and masonry:cold-rolled metal-framed wall systems needs review. x) small items: washers, spacers, weep holes lightning conductors rainwater goods all needs to be clarified. xi) can there be a temporary relaxation to Regulation 7(2) (BRE Global notes this is Not Part B) to allow further consideration of membranes etc. xii) the 'exemption from Regulation 7(2) for waterproofing material underground is good but could the exemption extend to stepped 'tanking' detailing? If so, the stepping on sloping sites may need to be of the order of 600mm high above Ground Level.
	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. this test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity . The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.12 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplications (see Regulation 7(3)) be disapplied for such 'other buildings'.

						Lastly, the respondent points to three pieces of guidance in AD B 10.15 and asks if membranes can be looked at again. They must continue to exclude damp. The respondent also asks for clearer evaluation of laminated glass and considers if it really should be banned and lastly the respondent asks if more guidance on thermal breaks can be provided. Curtain walls can be more than 2 storey high.
	146 (4)				☑	The respondent believes all buildings in the High risk category should be class A1 or A2. Hospitals at 17+m wrapped in combustible construction is an unacceptable risk.
Materials and products (10.7)	56 (4)				☑	The respondent asks for more definitive guidance on green wall/green roof and also blue roof technologies. The guidance in 10.7 is to refer to the DCLG guidance document. BRE Global notes the DCLG document does not give specific guidance. It also concludes by saying further research is needed.
	119 (4)				☑	The respondent asks for more definitive guidance on green wall technologies. The guidance in 10.7 is to refer to the DCLG guidance document. BRE Global notes the DCLG document does not give specific guidance. It also concludes by saying further research is needed.
Cavities and cavity barriers (10.8)	115 (4)				☑	B4 guidance refers back to B3 and section 8. Paragraph 8.2 refers to diagram 8.1. The respondent believes diagram is not 'modern' enough. Diagram 8.1 needs to become diagrams 8.1(a); (b); (etc)
	143 (4)				☑	The respondent believes that once the reader is referred back to Section 8, there should be detailed diagrams 8.1 (a), (b), (c) etc [BRE Global's suggestion bracketed] to make clear which cavities are relevant in extrusions (big cavities/little cavities). There are also cavities in double glazed units.

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	

Materials (10.12)	135 (4)				☑	The respondent confirms previous advice, given to Government under the consultation 'Review of the ban on the use of combustible materials in and on the external walls of buildings including attachments'. That advice included making (plasterboard, sheathing, outer-skins of rainscreens, spandrels, 'significant' material in balcony constructions and brise soleil) all subject to the 'ban'. The advice also acknowledged that the structure of buildings should be exempt from the ban [on the understanding further research was still going to be conducted - e.g. Needs for Total Fire Engineering of Mass Timber Buildings - constructed from structural timber]. The trigger height should have been 11m not 18m, with ongoing research into the height threshold and risks. BRE Global notes the contrast of this response to respondent 132 on combustible structures. The respondent's current observations include looking again at specified attachments etc - what can and cannot be exempted? BRE Global notes this strays to Regulation 7(3) which is outside the scope of the project but some of the 10.15 considerations are relevant. The respondent points to: i) the need to work with industry, particularly where guidance is produced; e.g. the joint guide produced by the Society of Facade Engineers and the Centre for Windows and Cladding Technology. The guide was produced to provide members with practical solutions to Regulations 7(2) and (3) and AD B paragraph 10.15. ii) avoid blanket bans of one product type but keep the research going to capture new materials. iii) the number of balcony types are many and varied. The respondent suggests referencing BS 8579 and providing diagrams in AD B to aid understanding. iv) look again at membranes. The respondent points to a concern that temporary solutions are building-in unknown risks to modern construction. BRE Global observes, the ban could be affecting Part C and possibly Part L compliance. v) more advice needed on curtain walls do's and don'ts including thermal breaks and the whole issue of glazing and laminated glass. vi) The primary structure should be 'exempt' from Regulation 7(2) as it will be assumed to be 'protected' en route to complying with B3 and B4. vii) clarify thermal breaks and curtain wall requirements (including guidance on spandrels and

						opaque glazing) and continue testing and experimenting. viii) blinds within glazed units of external walls. ix) damp proof courses and membranes in masonry:masonry walls and masonry:cold-rolled metal-framed wall systems needs review. x) small items: washers, spacers, weep holes lightning conductors rainwater goods all needs to be clarified. xi) can there be a temporary relaxation to Regulation 7(2) (BRE Global notes this is Not Part B) to allow further consideration of membranes etc. xii) the 'exemption from Regulation 7(2) for waterproofing material underground is good but could the exemption extend to stepped 'tanking' detailing? If so, the stepping on sloping sites may need to be of the order of 600mm high above Ground Level.
	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. This test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity. . The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.12 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplications (see Regulation 7(3)) be disapplied for such 'other buildings'. Lastly, the respondent points to three pieces of guidance in AD B 10.15 and asks if membranes can be looked at again. They must continue to exclude damp. The respondent also asks for clearer evaluation of laminated glass and considers if it really should be banned and lastly the respondent asks if more guidance on thermal breaks can be provided. Curtain walls can be more than 2 storey high.
Material change of use (10.13)	86 (4)				☑	The respondent asks for guidance when conducting material alterations. How far to go in removing combustible material from buildings? Cladding removal is obvious but what about the framework (if

						timber) or the sheathing ply or the inner leaf studwork? How far should one go? Paragraph 10.13 has been selected by BRE Global as the closest fit for this.
Additional considerations (10.14)	12 (4)	☑		☑		The respondent asks when is a wall not a wall? Is the roof-side parapet upstand exempt from the requirement to be constructed from A1 or A2 material? BRE Global observes there may be merit in clarifying this and clarify Appendix A: Key terms.
	44 (4)				☑	The respondent points out that it is not just balconies that can have an effect on external fire spread. The respondent asks for guidance on building geometry, columns (BRE Global believes this to mean encasements) string courses and building recesses. BRE Global has experienced the effect of recesses on vertical fire development but not string courses per-se. Hollow columns clad in combustible construction, on buildings <18m tall could easily lead to fire spread.
Additional considerations (10.15)	9	☑	☑	☑		The respondent asks if render stop and corner beads can be exempted from the need to comply with A1 or A2? This is a matter of clarification. This appears to relate to repair/renovation work. The new layer is an additional coating. In BRE Global's opinion, this is covered under Regulation 7(2) "... materials which become part of an external wall..." This respondent implies there may be an expectation that the pre-existing render coat, if not A1 or A2, will need to be hacked off? In BRE Global's opinion this would be for the Manual or FAQ's not AD B.
	12 (4)	☑				The respondent asks when is a wall not a wall? Is the roof-side parapet upstand exempt from the requirement to be constructed from A1 or A2 material? BRE Global observes there may be merit in clarifying this and clarify Appendix A: Key terms.
	37 (4)	☑	☑		☑	The respondent points to Regulation 7(3)(g) and asks whether membranes are exempt under the regulation. The AD B then seeks to 'control' them under 10.15(a). BRE Global suggests an additional line of explanation perhaps?
	65 (4)				☑	The respondent asks if acoustic baffles can be granted exemption in facades in buildings that trigger consideration under 7(2). BRE Global observes that there may be three considerations here i) deny the request to relax ii) relax it Like 10.15(a) for

						membranes or iii) require an A1 or A2-s1,d0 material but accept that the acoustic performance will be lessened.
	80 (4)	☑		☑		The respondent appears to be making three points relating to this paragraph: i) laminated balustrades... cannot there be more clarity on these where >18m? ii) when is a seal and membrane [BRE Global interprets this could apply to HDPE 'weathering sheets'... are they membranes or secondary 'seals'?] iii) specifically 10.15 (e) can the restriction on the thermal break rising no more than 2 compartments be clarified?
	83 (4)	☑		☑		The respondent points to the debate on use of EDPM material as a seal around windows and at joints in the sheathing board. i) Can a membrane to seal windows/doors to the inner skin be of lesser performance than B-s3,d0, if the membrane is narrow (say... 250mm wide)? ii) Ditto for joints in sheathing board where mastics and tapes and seals could be up to 150mm wide. ...Or, is 10.15(a) an absolute.? The respondent asks for a diagram to confirm this.
	85 (4)	☑		☑		The respondent asks if there can there be more guidance on when is a membranes a secondary seal? What is and is not allowed? Surely some seals will remain a membrane - e.g. around windows and doors EDPM.
	90 (4)	☑				The respondent says the guidance on wall roof junctions is no longer clear. When is a wall not a wall? Is the roof-side parapet upstand exempt from the requirement to be constructed from A1 or A2 material? BRE Global observes there may be merit in clarifying this and whether dormers are walls or a type of roof(?) clarify Appendix A: Key terms.
	113 (4)	☑				The respondent seems to say that because Regulation 7(3)g disapplies membranes from needing to achieve an A1 or A2-s1,d0 they can then achieve an E or F rating. BRE Global observes that this might be resolved in a diagram and a not(s). Note(s) could make it clear there that AD B provides practical guidance on how to meet the functional requirement- not the regulations. The respondent also says B_{ROOF} (t4) products are hard to find.

	115 (4)			☑		The respondent is saying that membranes achieving class B-s3,d0 are not sufficient to seal complex geometry windows/doors to the inner skin. This could be storing-up issues for structural robustness in the future. Fixings may become corroded more readily if barriers are too vapour permeable, and they may need strengthening replacing more readily than would have been the case with EDPM membranes. The respondent is asking if the membrane guidance can be reviewed? The respondent is also suggesting there should be definite guidance on need for fire stops within 'hollow' mullions and transoms.
	122 (4)			☑		The respondent believes the guidance is wrong. Regulation 7(3) disapplies Regulation 7(2) but the respondent believes it 'exempts' membranes from control. These are two different outcomes from three considerations. The considerations are: i) Regulation 7; ii) the schedule 1 relevant requirement B4; iii) guidance clause 10.15 in AD B. Also, the respondent has difficulty interpreting thermal break under 10.15 (e) The respondent asks for a diagram to explain the guidance.
	8 (4)				☑	Respondent seeks clarity on interpreting when is a wall not a wall - specifically a roof-side parapet upstand. Is it exempt from the requirement to be constructed from A1 or A2 material? BRE Global notes: if merit in clarifying then also clarify Appendix A: Key terms.
	29 (4)	☑		☑		The respondent believes metal trays are problematic and asks if 10.15 could include allowance for cavity trays in material other than A2-s1,d0 or A1?
	41 (4)				☑	The respondent says balustrade infills of laminated glass are safer than those comprising toughened glass (BRE Global believes this relates to Part K and containment). The respondent asks if use of laminated glass in frameless balustrades can be reconsidered.
	56 (4)	☑		☑		The respondent point out that where a balcony will be A1 or A2-s1,d0 (say the building is >18m tall) can laminated glass be allowed in balustrades?
	106 (4)				☑	The respondent asks that the benefits in preventing fatalities arising from falls following impact are weighed against the instances where laminated glass is the root cause of external fire spread where balconies are otherwise constructed entirely from A1 and A2 s2,d0 materials.

	109 (4)				☑	The respondent points to difficulties in complying with current Regulation 7(2) requirement: i) Terraces and inset balconies costly/difficult to achieve with non-combustible insulations. ii) EDPM seals (typically European class E) between windows and innerskin sheathing are vital for waterproofing. iii) Typical Vapour Control Layers are less expensive but have a lower classification than class B (and they are sandwiched between A1/A2 material). iv) Laminated glass balustrades should be reconsidered. The safety from falling must have higher 'status'. If balcony is A1 or A2 will the laminated glass alone give rise to fire spread risk? v) Thermal breaks much more work needed on what is and is not acceptable. On combustible thermal break has 2hr fire resistance. vi) How to resolve mullion voids. BRE Global observation seems to suggest if an assembly can be proven by test can that be an alternative to blanket A1 and A2 compliance.
	110 (4)				☑	The respondent addresses Regulation 7(2) and 7(3) as needing review. BRE Global notes this lies outside the scope of this project. The respondent believes Regulation 7(2) provides a 'deemed to satisfy' route. However, BRE Global notes the mandatory 'intent' of 7(2). The respondent suggests they would like for there to be an alternative route using BS 8414. BRE Global notes there is no such 'alternative route' where a floor is at >18m but there can be for a building with a floor at <18m. See comment at end relating to paragraph 0.9, which might clarify matters. The respondent mentions: i) That walls built using A1 and A2 could fail a BS 8414 test if suitably badly built. ii) A diagram would assist with understanding of 10.15, showing walkway/decks, terraces or roof gardens and if any could be considered not to be a specified attachment? Respondent seeks clarity on interpreting when is a wall not a wall - specifically a roof-side parapet upstand. Is it exempt from the requirement to be constructed from A1 or A2 material? The respondent seems to be suggesting a diagram would help understand what can/cannot be done with DPCs in different wall build-ups and a 'table' would be

						useful to consider a hierarchy of risk in buildings with different wall constructions.
	111 (4)				☑	The respondent is critical that spandrels and side panels cannot be glazed in laminated glass. BRE Global observes that Regulation 7(3) disapplies window frames and glass from the need to comply with Regulation 7(2). The guidance of AD B 10.15d is for laminated glass in spandrels and infills to comply with Regulation 7(2). The respondent asks if this could be reviewed believing an alternative, toughened glass, is unsuitable. The respondent believes toughened glass presents a danger with panes potentially 'falling-out' or 'exploding,' as a result of nickel sulphide inclusions. The respondent asks that this Part K danger is weighed against the risk/likelihood of laminated glass being a significant mechanism for fire spread. The respondent then asks a similar question regarding laminated glass in balustrades on balconies on buildings >18m tall. BRE Global notes that there is now one glass balustrade design that complies... perhaps other systems are in development? The counter argument is that toughened glass is not as safe as laminated or that no further systems are in development.
	126 (4)				☑	The respondent asks for clear guidance on: i) spandrels which now cannot be glazed in ordinary laminated glass. The respondent asks if there could be guidance on spandrels. ii) balustrade infills, the respondent believes a re-think of the laminated glass 'ban' is needed as toughened glass presents a danger as it has no inherent 'post breakage capacity'. iii) the guidance in Table 10.1 says there are no minimum requirements. This should be addressed. BRE Global view is that the guidance may have intended saying something like "...each case on its merits" rather than imply that no fire performance is needed. iv) thermal breaks. What is intended?
	131 (4)				☑	The respondent observes the following: i) Essential membranes (Elastomeric roof, DEC, Cavity trays and waterproofing membranes) cannot achieve the class B classification and further consideration on this matter is required. BRE Global notes that If damp is not excluded the wall may suffer under Part A and Part C.

						ii) window (including coloured glass), infill, spandrels all need to be defined so that designers have more confidence in industry and regulators' interpretation(s) iii) the thermal breaks in (e) need to be defined and placed in diagram(s).
	135 (4)				☑	The respondent confirms previous advice, given to Government under the consultation 'Review of the ban on the use of combustible materials in and on the external walls of buildings including attachments'. That advice included making (plasterboard, sheathing, outer-skins of rainscreens, spandrels, 'significant' material in balcony constructions and brise soleil) all subject to the 'ban'. The advice also acknowledged that the structure of buildings should be exempt from the ban [on the understanding further research was still going to be conducted - e.g. Needs for Total Fire Engineering of Mass Timber Buildings - constructed from structural timber]. The trigger height should have been 11m not 18m, with ongoing research into the height threshold and risks. BRE Global notes the contrast of this response to respondent 132 on combustible structures. The respondent's current observations include looking again at specified attachments etc - what can and cannot be exempted? BRE Global notes this strays to Regulation 7(3) which is outside the scope of the project but some of the 10.15 considerations are relevant. The respondent points to: i) the need to work with industry, particularly where guidance is produced; e.g. the joint guide produced by the Society of Facade Engineers and the Centre for Windows and Cladding Technology. The guide was produced to provide members with practical solutions to Regulations 7(2) and (3) and AD B paragraph 10.15. ii) avoid blanket bans of one product type but keep the research going to capture new materials. iii) the number of balcony types are many and varied. The respondent suggests referencing BS 8579 and providing diagrams in AD B to aid understanding. iv) look again at membranes. The respondent points to a concern that temporary solutions are building-in unknown risks to modern construction. BRE Global observes, the ban could be affecting Part C and possibly Part L compliance. v) more advice needed on curtain walls do's and don'ts including thermal breaks and the whole issue of glazing and laminated glass. vi) The primary structure should be 'exempt' from Regulation 7(2) as it will be

						assumed to be 'protected' en route to complying with B3 and B4. vii) clarify thermal breaks and curtain wall requirements (including guidance on spandrels and opaque glazing) and continue testing and experimenting. viii) blinds within glazed units of external walls. ix) damp proof courses and membranes in masonry:masonry walls and masonry:cold-rolled metal-framed wall systems needs review. x) small items: washers, spacers, weep holes lightning conductors rainwater goods all needs to be clarified. xi) can there be a temporary relaxation to Regulation 7(2) (BRE Global notes this is Not Part B) to allow further consideration of membranes etc. xii) the 'exemption from Regulation 7(2) for waterproofing material underground is good but could the exemption extend to stepped 'tanking' detailing? If so, the stepping on sloping sites may need to be of the order of 600mm high above Ground Level.
	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. this test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity. The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.12 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplication's (see Regulation 7(3)) be disapplied for such 'other buildings'. Lastly, the respondent points to three pieces of guidance in AD B 10.15 and asks if membranes can be looked at again. They must continue to exclude damp. The respondent also asks for clearer evaluation of laminated glass and considers if it really should be banned and lastly the respondent asks if more guidance on thermal breaks can be provided. Curtain walls can be more than 2 storey high.

Section 13: Vehicle access

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Intention	150 (5)			☑		The respondent asks for a review of firefighter access into buildings from the entrance door to the staircase and at all levels in a building.
	16				☑	Respondent says mobility impairment is the most underdeveloped part of AD B. BRE Global observes this respondent has 'ticked' every section. In our opinion they intend for mobility impairment issues to be considered across all parts of AD B. The comment has been repeated in both Volumes under S 0, B1, B5 and Regulation 38
	101 (5)				☑	The respondent raises a concern that water pressures, flow rates need to be a consideration.
	125 (5)				☑	The respondent believes Fire and Rescue Services are increasingly wary about sending personnel into burning buildings where fire is spreading though cavities and the construction is combustible. BRE Global interprets the respondent's opinions as also suggesting that routes leading to protected shafts (stairs) must not be constructed from combustible material(s). Lastly, the respondent believes toxicity needs to become a consideration.

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Provision and design of access routes and hardstandings (13.2)	56 (5)				☑	The respondent challenges the guidance that where a hose length would exceed 45m - if measured from furthest corner of furthest flat to the parked-up pump one then needs a dry main. The respondent argues for an option to install sprinklers or a mist system.

Provision and design of access routes and hardstandings (13.3)	24 (5)	☑		☑		The respondent asks for greater guidance on surrounding streets and landscaping, parking, access to hydrants (parking over hydrants). The suggestion is that there should be a review of guidance.
	139 (5)	☑				The respondent asks for a review of vehicle sizes, turning circles, weights etc. The respondent says border counties need to give consideration to pump and aerial appliances arriving at a fire from Wales or Scotland. Accordingly for border counties there might need to be slightly different guidance than would be the case for the rest of the country.
Provision and design of access routes and hardstandings (13.4)	121 (5)	☑		☑		The respondent believes vehicular access is not understood and suggests clearer guidance be given in the introduction.
	23 (5)	☑				The respondent asks if hose lengths and reversing distances are outdated? Fire and Rescue Services are more flexible than the document. This needs to be reviewed.
	33 (5)	☑				The respondent believes the Fire and Rescue Service are more flexible than 13.4 suggests. The Fire and Rescue Services acknowledge difficulties on 'tight' sites including turning circles. The respondent suggests the guidance needs review.
	37 (5)				☑	The respondent believes reversing distances are outdated. The respondent believes that on 'multi-block' sites 20m rule is inappropriate, also, the reversing technologies onboard vehicles have improved. Review?
	47 (5)			☑		The respondent believes width of access roads referred to in table 13.1 is inappropriate for rural areas. In Cornwall for example, Fire and Rescue Service pump appliances are quite narrow.
	56 (5)			☑		The respondent believes the limitation on the length of access roads, referred to in diagram 13.1, is inappropriate for rural areas. The respondent believes Fire and Rescue Service pump appliances are as capable of accessing a development as the dust cart or the average delivery lorry. The respondent believes this reverse distance rule needs a review.

	59 (5)				☑	The respondent makes the point that some of the B5 triggers may not be based on science or current physical limitations. Are some triggers now inappropriate? The respondent believes access in rural areas may need to be different to access in urban areas. Lastly, the respondent believes alternative provisions like sprinklers may be an option. BRE Global placed this comment at 13.4 where it picks up on guidance of Diagram 13.1 and Table 13.1. The respondent is suggesting a review of all B5 triggers.
	64 (5)			☑		The respondent points out that at 20m 'limit' some designers/developers are erecting bollards. Could cause delay as equipment has to be carried further. BRE Global is not sure this practice would be widespread but in the light of the comments, perhaps additional guidance is needed - diagram? Presumably a pump appliance parks up and is still within 45m of the furthest point in the new-build building.
	93 (5)				☑	The respondent asks for access and turning circles to be reviewed. The NHBC Technical Extra 23 could be a place to start with the review.
	98 (5)				☑	In the respondent's view access and turning facilities leads to the furthest point in the furthest plot(s) on new developments being >45m away from a parked appliance. In BRE Global's view the diagrams in the NHBC's Technical Extra Note 23 could be a basis for discussion and review.
	100 (5)				☑	The respondent believes reversing distances are outdated. The respondent believes the reversing technologies onboard vehicles have improved. The respondent would like a review of the 45m rule could it be longer?
	108 (5)				☑	The respondent believes reversing distances are outdated and need review. The respondent also believes where the 45m rule cannot be met that suppression should be considered as per the guidance of BS 9991
	142 (5)	☑				More guidance needed for landlocked sites.
	146 (5)				☑	The respondent believes that the vehicular access guidance needs review. The respondent points out that current Fire and Rescue Service vehicles may be

						different from those considered when guidance last reviewed.
	149 (5)				☑	The respondent asks for review of vehicle access to buildings to reflect current equipment.

Section 14: Fire mains and hydrants – flats

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Provision of fire mains (14.2)	135 (5)				☑	The respondent suggests that two rising mains should be provided in each firefighting shaft. The respondent suggests one should be located in the stair and the other located in the lobby. The respondent is suggesting that for buildings with firefighting shafts, only the layout in Diagram 15.1(a) is now considered acceptable and option (b) should be removed as an option.
Provision of fire mains (14.3)	56 (5)				☑	The respondent challenges the guidance that where a hose length would exceed 45m - if measured from furthest corner of furthest flat to the parked-up pump one then needs a dry main. The respondent argues for an option to install sprinklers or a mist system.
Design and construction of fire mains (14.4)	135 (5)				☑	The respondent suggests that two rising mains should be provided in each firefighting shaft. The respondent suggests one should be located in the stair and the other located in the lobby. The respondent is suggesting that for buildings with firefighting shafts, only the layout in Diagram 15.1(a) is now considered acceptable and option (b) should be removed as an option.
	146 (5)				☑	The respondent points out that current firefighting techniques results in the laying of hoses through door between stair and common corridor. The impact of smoke leakage and the physical trip hazard to those choosing to escape needs to be considered. Review of 14.4 and therefore diagram 15.1 needed. The respondent also asks if stair widths need review. 3.60 included.

	150 (5)				☑	The respondent suggests that stair widths need review to consider: contraflows and obstructions on stairs (hoses) all now needs review. The respondent also suggests the time may be right to consider secondary stairs, firefighting lifts and the functionality (controls) of these lifts. The requirements should not be designed out by fire engineering. BRE Global includes Paragraph 0.9 as this seems the only logical place to pick up that alternative approaches might not be suitable in all instances.
Provision of private hydrants (14.8)	51 (5)				☑	The respondent says that flats are likely to be <280m^2 on plan. BRE Global concludes it is reasonable to assume sizeable new development(s) could be judged on the 100m rule alone. The respondent believes this needs review. BRE Global also notes the points made by other respondents about reversing distances. Perhaps if reversing distances is reviewed this would go hand in hand with location of nearest hydrant.
	57 (5)				☑	The respondent asks is it appropriate for new blocks of flats (should individual compartments be <280m^2 on plan) to be acceptable on basis of there being a hydrant within 100m? Whilst noting the comment by the respondent, BRE Global observes that there is no guidance as to how to measure the 100m distance nor how paragraph 14.9 interacts with 14.8 with respect to methods of measurement.
	129 (5)	☑		☑		The respondent says the qualification criteria of 280m^2 as a compartment size is outdated. The respondent suggests that hydrants should service new developments irrespective of 'compartment size'.
	142 (5)				☑	The respondent says the qualification criteria of 280m^2 as a compartment size [taken on its own] means that the majority of new developments do not result in increased provision of hydrants on the 'network'. The respondent also points out that the onus is on accepting existing hydrants, if they exist. BRE Global notes that an existing hydrant on an existing network may be operating at a lower water pressure and lower flow rate than would be considered ideal. BRE Global concludes: i) there is no 'uplift', in provision, which would occur if new hydrants were needed on every occasion. ii) there is no onus on

						water companies to ensure supplies achieve requisite pressures/volumes.
Alternative supply of water (14.13)	121 (5)				☑	The respondent asks how designers, developers and building control bodies will know what an acceptable water source is. This needs more clarity. Does the Fire and Rescue Service have to enter into an MoU with the water company? BRE Global believes drought is also an issue to consider.

Section 15: Access to buildings for firefighting personnel – flats

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Provision of firefighting shafts (15.1)	132 (5)				☑	The respondent believes paragraph 15.1 is flawed because it suggests that reasonable facilities to assist firefighters in the protection of life are: i) vehicle access and ii) using the building's means of escape. The respondent points out that in combustible construction fire has the potential to enter cavities and spread unseen - possibly to emerge behind firefighters' position. The respondent believes that safe access, for protection of life, must not run the risk of becoming 'cut-off' by fire. The respondent believes that for safe retreat, construction of corridors and stairways must not be combustible. Lastly, in the respondent's opinion cladding combustible construction, in plasterboard, to achieve an REI of 60minutes is unacceptable if the primary construction could add to the fire and its propagation.
Provision of firefighting shafts (15.2)	55 (5)				☑	The respondent points to two problems which AD B cannot directly help with: i) the first relates to contractors' expectation that they should be able to 'gain access' to the respective Fire and Rescue Service's Fire Safety Engineering team for Pre-application advice. ii) the second relates to the time it takes for a statutory (building regulations) consultation to complete - frequently this can occur at or after practical completion.

						The third point the respondent makes concerns some Local Planning Authorities asking for compliance with the London Plan [policy D5(B)(5)]. This entail planners asking for Evacuation Lifts to satisfy planning requirements. Perhaps DLUHC needs to give consideration to primacy of legislation.
	135 (5)				☑	The respondent suggests that two rising mains should be provided in each firefighting shaft. The respondent suggests one should be located in the stair and the other located in the lobby. The respondent is suggesting that for buildings with firefighting shafts, only the layout in Diagram 15.1(a) is now considered acceptable and option (b) should be removed as an option.
Provision of firefighting shafts (15.7)	23 (5)	☑				The respondent asks if hose lengths and reversing distances are outdated? Fire and Rescue Services are more flexible than the document. This needs to be reviewed.
Design and construction of firefighting shafts (15.8)	84 (5)	☑				The respondent says there are differing opinions on what constitutes an acceptable approach to the firefighting shaft through reception or similar areas. The respondent asks if this paragraph can be expanded upon. BRE Global believes perhaps a diagram would help as would a cross sectional view through the buildings in Diagram 15.2.
	53 (1)				☑	The respondent suggests the fire outlet needs to be provided in a lobby between the main corridor and the stair. The respondent says this means the residents of upper floors can make their escape if they so wish because the door between the stair and the common corridor will not be open. Note this would mean changing paragraph 15.8 and omitting option b from diagram 15.1. The respondent describes setting up a bridgehead on the floor above the floor of fire origin. This is unusual and may need to be followed up on. As this goes against previous guidance and would need FRS National Operational Guidance to be considered.
	50 (5)				☑	The respondent believes that the layout in diagram 15.1(b) for flats, results in one door protection to the firefighting stair i.e. '...designs that are dangerously close to tenable limits for firefighters...' Can this be reviewed?

	53 (5)				☑	The respondent points to new operational firefighting techniques (see FRS circular 32/2006 item 3.12). The respondent is asking for 150mm diameter rising mains to allow greater flow draw-off at each floor. The respondent also suggests this may have implications for smoke control design. BRE Global observes that the takeaway from this technical response is that: i) there are new operational techniques to consider. ii) whether the pipe diameter alone is sufficient iii) should there also be a debate on the guidance of diagram 15.1 i.e. is diagram 15.1a still tenable?
	128 (5)				☑	The respondent points to likelihood of smoke entering a stair if hoses run up the stair from a bridgehead on a floor below. The respondent believes these are also a trip hazard on stairs. A suggestion from the respondent is to remove option b from Diagram 15.1. Maintain a lobby as 15.1a. Water supplies also needs to be re-considered.
	142 (5)				☑	The respondent says that the stair and lobby of a firefighting shall should be provided with a means of venting heat and smoke. The respondent also says it is important for there to be override controls so that the Fire and Rescue Service may close them to suit operational needs.
Design and construction of firefighting shafts (15.9)	132 (5)				☑	The respondent believes paragraph 15.1 is flawed because it suggests that reasonable facilities to assist firefighters in the protection of life are: i) vehicle access and ii) using the building's means of escape. The respondent points out that in combustible construction fire has the potential to enter cavities and spread unseen - possibly to emerge behind firefighters' position. The respondent believes that safe access, for protection of life, must not run the risk of becoming 'cut-off' by fire. The respondent believes that for safe retreat, construction of corridors and stairways must not be combustible. Lastly, in the respondent's opinion cladding combustible construction, in plasterboard, to achieve an REI of 60minutes is unacceptable if the primary construction could add to the fire and its propagation.
Rolling shutters in compartment walls (15.12)	84 (5)	☑				The respondent says there are differing opinions on what constitutes an acceptable approach to the firefighting shaft through reception or similar areas.

						The respondent asks if this paragraph can be expanded upon. BRE Global believes perhaps a diagram would help as would a cross sectional view through the buildings in Diagram 15.2.

Section 16: Venting of heat and smoke from basements – flats

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Provision of smoke outlets (16.2)	117 (5)	☑				The respondent asks to which standard should mechanical smoke extract systems, serving basements, be commissioned to. The respondent also asks for some commentary on why the 10 air changes per hour is the value chosen?
Mechanical smoke extract (16.11)	27 (3)				☑	The respondent believes even ventilated car parks should be sprinkler protected. The suggestion cars do not provide a hazard is suggested as being outdated. BRE Global's view (after Fires in Enclosed Car Parks 2007 and Fire Spread in Car Parks BD 2552) was that fire will spread from one car to the next separated by an unfilled parking bay. Car stackers are even more problematic, in essence more research is needed but the previous assumptions of fires not spreading from one car to the next can be challenged under certain situations/conditions.
	119 (5)				☑	The respondent believes the notion that car parks do not need sprinklers is outdated and cites Kings Dock and Douglas shopping centre Ireland [BRE Global adds Stavanger airport car park fire] to support the case that car parks now need careful consideration. The respondent cites the use of plastics and electric battery fires. The respondent also asks for better guidance on termination of air exhausts, preventing smoke from blowing back into accommodation on upper levels.
	134 (5)				☑	The respondent acknowledges that modern cars come with modern risks (plastics and batteries). The respondent is asking for better guidance on sprinkler system requirements for car parks and for a

						holistic consideration of sprinklers, impulse fans and smoke extraction systems. BRE Global adds to this that car parks are seldom simple undercroft spaces. Increasingly they are complex, multi-level and deep spaces with recesses corners and blind 'dead' spaces.

Regulation 38

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Introduction – Regulation 38	24 (38)				☑	The respondent suggests Regulation 38 is ineffective because there is no legal bar to prevent the issue of a completion certificate. The Respondent suggests a link between Regulation 38 and Gateway 3 (as originally proposed by Hackitt).
	46 (38)				☑	The respondent suggests Regulation 38 is not being 'enforced'.
	58 (38)				☑	The respondent suggests Regulation 38 is ineffective because there is no 'control' over it.
	62 (38)				☑	The respondent suggests Regulation 38 is a 'good idea but demonstrates a lack of understanding as to what goes on.' The respondent suggests more work is required for Regulation 38 to be effective.
	86 (38)				☑	The respondent suggests Regulation 38 information needs to be submitted to the Building Control Body to be 'checked'.
	108 (38)				☑	The respondent suggests more guidance is needed on the exact information required for a Regulation 38 submission. BRE Global observes that the respondent believes Building Control Bodies should be checking it (This would require revision to the regulation itself).
	119 (38)				☑	The respondent suggests Regulation 38 needs more work. Who supplies the information and who it is for? Is it destined for the premises information box? BRE Global observes the respondent writes about responsibilities but does not raise directly who should be checking the information.

	121 (38)				☑	The respondent suggests Regulation 38 is not being observed. BRE Global observes there is currently no 'enforcement' element to the process.
	132 (38)				☑	The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6 (d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
	142 (38)				☑	The respondent suggests Regulation 38 is not being enforced. A previous respondent said 'nice idea...' The respondent suggests that when designs change there must be a review of the strategy. BRE Global observes this lies outside of Regulation 38.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. The respondent therefore believes Regulation 38 information may be incorrect and is often unchecked.
Essential information (17.3)	100 (38)	☑		☑		The respondent suggests more guidance is needed on the exact information needed to satisfy Regulation 38.
	16				☑	Respondent says mobility impairment is the most underdeveloped part of AD B. BRE Global observes this respondent has 'ticked' every section. In BRE Global's opinion they intend for mobility impairment issues to be considered across all parts of AD B. The comment has been repeated in both Volumes under S 0, B1, B5 and Regulation 38.

	86 (3)	☑				Can it be made explicit in the AD that isolation valves on a BS 9251 sprinkler system must not be at each floor level (alone). The respondent makes the point that there must be a means of isolating each flat from the corridor immediately outside the flat.
	108 (38)				☑	The respondent suggests more guidance is needed on the exact information required for a Regulation 38 submission. BRE Global observes that the respondent believes Building Control Bodies should be checking it - this would require revision to the regulation itself.
	112 (38)				☑	The respondent suggests more guidance is needed on the exact information required for a Regulation 38 submission and to draw a responsible person's attention to the location(s) of combustible construction in the building.
	132 (38)				☑	The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6 (d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
	142 (38)				☑	The respondent suggests Regulation 38 is not being enforced. A previous respondent said 'nice idea...' The respondent suggests that when designs change there must be a review of the strategy. BRE Global observes this lies outside of Regulation 38.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. The respondent therefore believes

						Regulation 38 information may be incorrect and is often unchecked.
	150 (38)	☑		☑		The respondent says the guidance under Regulation 38 needs to be kept under review, lest the information being passed on becomes unwieldy. BRE Global has observed that contractors can become overly focussed on one finish line 'practical completion'. The respondent's concern is that Regulation 38 information should not go the same way as O&Ms (... sometimes quantity not quality) accordingly a checklist for Regulation 38 might be appropriate.
Additional information for complex buildings (17.6)	84 (1)				☑	The respondent points to the new London Plan Policy D5 (B5) which is intended to be published. This policy if implemented will require that where a lift (bank of lifts) is provided in a block of flats one or more of them will need to be an evacuation lift to effect dignified evacuation in fire. This is a modern design requirement if implemented. This will affect guidance in diagram 15.1 to favour only option 15.1(a).
	86 (1)				☑	This respondent asks that evacuation of disabled people is considered at planning stage. Note the new London Plan Policy D5 (B5) is intended to be published. This policy, if implemented, will require that where a lift is provided in a block of flats one or more lifts needs to be an evacuation lift to affect dignified evacuation in fire. This is a modern design requirement if implemented. This will affect guidance in diagram 15.1 to favour only option 15.1(a).
	132 (38)				☑	The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6 (d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes

						tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. the respondent therefore believes Regulation 38 information may be incorrect and is often unchecked.
	150 (38)					The respondent says the guidance under Regulation 38 needs to be kept under review, lest the information being passed on becomes unwieldy. BRE Global has observed that contractors can become overly focussed on one finish line 'practical completion'. The respondent's concern is that Regulation 38 information should not go the same way as O&Ms (... sometimes quantity not quality) accordingly a checklist for Regulation 38 might be appropriate.

Appendix B

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Appendix B- Performance of materials, products and structures	6 (2)	☑	☑			The respondent points to Information previously being in Table A8. Table A8 is now removed. Can it be reinserted as regulators unsure if paint on plaster or paint on plasterboard needs to be proven by fire testing and classification to BS EN 13501.
	8		☑	☑		The respondent seeks more guidance on inverted roofs particularly, the gaps between paving slabs. How much insulation is exposed between paving slabs? What is acceptable?
	12	☑	☑			BRE Global interprets the point on Section 12 in V1 and Section 14 in V2 to equate to former Table A5. It is noted that there is no equivalent table in Appendix B.

	17 (2)	☑				The respondent complains that the whole section is too complex. BRE Global notes no alternative given. Either review or consider more information. Appendix B and former table 8 may play a part. If former table A8 were reintroduced, following a review, it may help people understand the BS EN 13501-1 classifications more?
	18 (2)				☑	The respondent believes the method for testing thermoplastic materials outdated. Test method 508A, as referenced in BS 2782 is obsolete. The respondent asks if AD B can refer to test method 508A which shows as in BS 2782?
	149 (2)	☑				This respondent wants a cut-off date whereby only BS EN Classifications can be used. The reliance on BS 476 should cease. BRE Global observation: If the whole regime goes to BS EN 13501, it would be useful to have an appendix in AD B that states i) how the tests need to be conducted to reflect real life and to look at issues such as joints, mounting and backing board material and ii)what to look for in the field of application (extended application) commentary. BRE Global's second observation regarding the respondent's point that suppliers can trade on 'ancient evidence'. Even if the whole regime moves to BS EN 13501 testing, there should be liaison with the Construction Products Regulator to agree regime protocols and frequency of re-testing.
	110 (3)	☑				The respondent points to the diagram 5.2 and asks what can and cannot be taken over the head of a compartment wall. Can thermoset insulants carry over the compartment wall? The respondent asks if there can be a definition of thermoplastic V thermoset insulations in Appendix B as users of thermoset insulants are confused. BRE Global is conducting experimental testing in 2022.
	113 (3)	☑				The respondent would like it to be made clear that insulated plasterboard should not be specified to provide fire resistance to walls requiring fire resistance - unless it has been tested.
	15				☑	This respondent sees Fire Resistance and Reaction to Fire as being different tests which somehow need to be considered together. Can we somehow combine them.

						BRE Global's example to exhibit this comment could be... ... A masonry cavity wall could achieve 2hr fire resistance and perform well in RTF test(s) conversely, ... a composite panel may (?) achieve 2hr fire resistance but perform poorly in Rtf test(s) BRE Global observation it could be possible to use existing fire resistance tests, for example, to indicate reaction to fire properties.
	135				☑	The respondent advises on report titled: Needs of total fire engineering of mass timber buildings, to help in consideration of cross laminated timber and glue lam timber buildings. What is a realistic fire load and how will a timber building of this design respond?
	18 (2)				☑	The respondent believes the method for testing thermoplastic materials outdated. Test method 508A, as referenced in BS 2782 is obsolete. The respondent asks if AD B can refer to test method 508A which shows as in BS 2782?
	59 (2 & 3)				☑	Regarding Part B The respondent makes it clear that it is too confusing checking whether a Test house is entitled to conduct a test or not? Are they UKAS accredited or not? Test certificates must include field of application and not just the test result.
	62 (2)				☑	Marked as new item but only because it may need to link with the work of the Building Safety Regulator or Construction Products Regulator in BEIS. This respondent believes manufacturers disguise results. BRE Global interpretation: should manufacturers have to make a declaration of compliance with the standards referred to in AD B? Like a Declaration of performance (DoP) but for AD B referenced standards.
	108 (2)				☑	Respondent points out that Generic materials were covered in AD B. BRE Global notes this relates to former Table A8. Respondent wants it reinstated.
	113 (2)	☑	☑			The respondent points to Information previously being in Table A8. Table A8 is now removed. Can the contents of table A8 be reinstated? The respondent believes it is increasingly difficult to

						challenge manufacturers to justify performance ratings to correct standards. BRE Global's observation... although unsaid, this links with the point made by respondent 62. BRE Global interprets the thrust of respondent 62's comments and this respondent's comments as meaning perhaps there should be Declaration of Performance (DoP) for all materials brought to market so that unless declared they cannot be marketed. Should this dovetail with the work of the Construction Products Regulator in BEIS? The basic original request though was for table A8 to be reintroduced in Appendix B.
	100 (3)				☑	The respondent believes combustible constructions, irrespective of height should be required to have sprinklers installed.
	101 (3)				☑	The respondent is pointing out that compartmentation considerations required under Table B3 where windows extend full height i.e. where there are no meaningful spandrels. Also raises the question "should spandrels be included in Table B3"?
	105 (3)				☑	This respondent says that testing light fittings in different configurations of floors is very expensive. Are there extended applications that can be developed for light fitting tests? See B4 in Appendix B
	119 (3)				☑	The respondent asks for guidance on how to protect/not protect mass timber structures. what is and is not acceptable?
	125 (3)				☑	The respondent asks that reasonable period for the purpose of functional requirement B3(1) includes consideration of: i) combustibility of external walls and structure. ii) What is the site next door? E.g. on one site there may be an office tower block and on the adjacent site a care home. BRE Global observes that this would be difficult to 'police' ... ever moving goalposts as sites develop? iii) the robustness of the fire protection susceptibility to damage. iv) the mobility of occupants Should compartment walls be constructed of A1 or A2-s1,d0 lest they contribute to fuel load if they fail? The respondent notes condition 2 and condition 6 in Table B3 and asks for clear guidance... if a load bearing wall is designated 'compartment ' it only needs

						60minutes... if not designated compartment it has to be 90 or 120 perhaps?
	128 (3)				☑	The respondent asks, in general terms, about lightweight framed construction. BRE Global interprets this to mean that a standard test is needed for lightweight panelised or volumetric construction.
	132 (3)				☑	The respondent suggests that a reasonable period for the purpose of functional requirement B3(1) cannot be met in any building adopting a 'stay put' strategy for Means of Escape where the construction frame is combustible. The respondent points to several fires: Beechmere, Bennett Close, Moorfield hotel and Manthorpe Avenue. The respondent believes the height of building is irrelevant to the speed of fire spread and severity of fire and the spread of the fire once in a cavity. BRE Global observation... In a 2011 presentation by Dr Crowder titled: Potential Perils of Modern Methods of Construction - a short introduction, multiple fires in combustible framed buildings were reviewed. Two buildings were fully alight in 6 minutes... "engulfed" was the word used to describe the fire in Colindale in 2006. BRE Global notes, however, that the fire at Colindale related to a timber framed building under construction. In the respondent's view, the 2011 presentation suggests that combustible construction is 'problematic'. The respondent is not proposing a solution other than saying longer periods of fire resistance are needed and there must be a review of the layers used to achieve the fire resistance. Low rise developments like Colindale at <18m are at significant risk if the fire gets into the structure.
	55 (4)				☑	The respondent seeks clearer guidance on testing. Should systems or products be tested? The respondent reports that there is still confusion and a wide difference in interpretation. Additionally, can the introduction to AD B make clear that if other requirements e.g. Local Planning Authority and or GLA and (or other) are more onerous than Building Regulations (effectively demanding Building Regulations++ compliance then those requirements fall outside the scope of AD B. BRE Global observes this latter point causes confusion in the industry and may even lead to technical conflicts. The standing of AD B must be clear.

	87 (4)			☑		The respondent points out that guidance is lacking for materials requiring adhesives in their manufacture. BRE Global notes Table A6 in the old AD B (Use and definitions of non-combustible materials) gave guidance on this.
	115 (4)					The respondent says paint finishes on metals are just not being tested to BE EN 13501-1. BRE Global notes there may be a link here to the work of the Construction Products Regulator. Construction products (including different pain finishes) should be tested to the standards applicable (including BS EN 13501).

AD B Volume 2

Section 0: Approved Document B: Fire safety – buildings other than dwellings

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Alternative approaches (0.9)	14 (0)	☑		☑		If it is intended that BS 9999 could be used in its entirety (in lieu of following AD B or BS 7974) then could paragraph 0.9 be more explicit about the acceptability of using BS 9999 from cover to cover. Define what is to be ignored from the BS 9999 document too.
	100 (0 & 1)	☑		☑		The respondent seeks clarity on what the document can and cannot be used for. The respondent is concerned that AD B is losing its standing. Industry seems to be using BS 9991 and BS 9999 in preference over AD B. Should AD B positively state that it should be used wherever possible? Should designers have complete freedom to use any one of the 3 documents? BRE Global is unaware of this shift away from AD B to BS 9991 and/or BS 9999.
	121 (0)			☑		The respondent seeks more definitive guidance. The respondent warns against cherry picking.
	59 (2)				☑	The respondents comments under Volume 1 apply equally here (availability of standards referred to,

						complexity, more comprehensive guidance which is easier to understand). BRE Global is not aware of surface spread of flame requirements being more difficult to understand where they relate to shop fit outs and interior design.
	112 (4)	☑				The respondent provided a full response touching on considerations and suggestions. Considerations: i) The 'ban' should be on high rise and high risk buildings. ii) The Hackitt Review and the Public Inquiry have both identified a shortfall in competence in design, construction ongoing maintenance of buildings. Add to this, combustible materials, and there is then a strong likelihood of large fire/fire spread. If you remove combustibles this lessens the risk. Suggestion: i) Assembly buildings should be included in the ban. ii) the trigger height should reduce from 18m to 11m (a height which is WITHIN Fire and Rescue Service's capabilities and NOT at the limit of their capabilities). BRE Global notes the respondent states "AD B still allows BS 8414 - BR 135 route for buildings over 18m". BRE Global also notes the respondent asks that the 'ban' should apply to many uses that the ban already applies to under Regulation 7(4)(a)ii and iii. BRE Global also notes that the respondent believes an 11m trigger or a fourth storey trigger (whichever the lower) should apply. BRE Global assumes the respondent means if the building has a fifth storey or fourth floor level? In summary: A diagram with footnote(s) would help make clearer the buildings to which guidance clause 12.11 applies and what Regulation 7(2) means. Perhaps include a note that for the purposes of this paragraph alternative approaches (as per paragraph 0.9) disapplies.
	60 (0)				☑	What is considered a common building? Modern buildings unlikely to be classified as common buildings?.
	132 (0)				☑	The respondent points out that visually fire may not be spotted straight away due to inadequate fire resistance protecting the combustible structure. They believe the building regulations do not give enough guidance for the protection against combustible structures.
	142 (0)				☑	The respondent asks where guidance is applicable (common buildings types)

	143 (0)				☑	Common building types and the respondent observes that the AD should be more ambitious to include modern methods of construction (Construction playbook December 2020 and construction leadership council priority). There should be a process for considering and accepting alternative industry guidance as an equivalent to AD B guidance (e.g. CWCT interpretation of Regulation 7 (2)).
	146 (0)				☑	Respondent seeks separate guidance is needed for combustible constructions e.g. CLT. AD B does not appear to be suitable for combustible construction.
	24 (1)			☑		The presumption should be to fit a fire detection alarm when any building work takes place.
	33 (1)				☑	The respondent is challenging the concept of common building types and which guidance document i.e. AD B, BS's, BS EN's, or fire engineering solutions should apply. Guidance should be clear so as to avoid cherry picking between documents/ approaches. The respondent cites that modern buildings are not just square/rectilinear but comprise a multiplicity of shapes and challenge AD B in its current form.
	130 (1)				☑	The respondent believes that standards referred to may become out of date but remain cited in the Approved Document. The respondent asks whether the intention is now that one should refer to the latest BS rather than the one current at the time of publication of AD B? BRE Global notes the guidance in the 2019 edition is a significant departure from previous editions which stated that; "When an Approved Document makes reference to a named standard, the relevant version of the standard is the one listed at the end of the publication". This departure maybe at odds with the intent and wording used in The Building Act 1984.
	132 (1)				☑	The respondent suggests that AD B is intended for common structures/ building types and that combustible construction is incompatible with this principle.
	110 (4)				☑	If Paragraph 12.6 is to be correctly interpreted (as a follow-on from Regulation 7(2) perhaps a sentence is needed, at the end of 12.6 , that disapplies paragraph 0.9 as alternative approach as far as 12.6 goes?

Section 2: Design for horizontal escape

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Single escape routes and exits (2.7)	36 (1)	☑				The respondent is asking whether we can have guidance (examples) of different scenarios of main and ancillary- use purpose groups i.e. which travel distance to follow. Can this be clearer?
	93 (1)	☑				The respondent believes sections 2.7 and diagram 2.1 and section 2.10 and diagram 2.2 in particular should be clarified and made more user friendly.
	121 (1)	☑				The respondent believes sections 2.7 and diagram 2.1 and section 2.10 and diagram 2.2 in particular should be clarified to give further examples of the 45 degree and alternative exits principles.
	134 (1)	☑				The respondent suggests that direct distance and travel distances are not understood and asks for better diagrams and/or explanatory text. The respondent suggests this is particularly important where the layout of internal partitions is not known at the time of the application being made.
	146 (1)	☑				The respondent asks for clarity on the principle of accessing the nearest not the furthest exit within 45m (or other distance as described in table 2.1). The respondent seems to be asking for better diagrams. BRE Global does not see the difficulty that the respondent points to.
Alternative escape routes (2.10)	93 (1)	☑				The respondent believes sections 2.7 and diagram 2.1 and section 2.10 and diagram 2.2 in particular should be clarified and made more user friendly.
	121 (1)	☑				The respondent believes sections 2.7 and diagram 2.1 and section 2.10 and diagram 2.2 in particular should be clarified to give further examples of the 45 degree and alternative exits principles.
Open spatial planning (2.13)	37 (1)	☑		☑		Paragraph 2.13: What research guided the 4.5m rule which seems to relate to unvented lobbies in flats.
	84 (1)				☑	The respondent asks for commentary in AD B regarding open spatial planning and the reasoning behind the 4.5m principle around voids in floors.

	117 (1)	☑				The respondent asks for commentary in AD B regarding open spatial planning and the reasoning behind the 4.5m principle around voids in floors.

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
General provisions (2.34)	84 (1)				☑	The respondent suggests that the provision of sprinklers is mandatory in ALL care homes, irrespective of size and irrespective of the escape strategy being progressive horizontal evacuation or simultaneous evacuation. BRE Global interprets the respondent's comment to mean sprinklers should not be a compensatory feature (e.g. for the removal of self-closing devices or wards being large i.e. with more than 10 beds).
	59 (1)				☑	The respondent observes there are many care homes formed by conversion and extension of dwellings (or other buildings) and asks for guidance where existing care homes are formed by material change of use and or they are adapted/extended. The respondent asks that any additional guidance should consider that care homes are 'a-typical' they are not perfect to allow progressive horizontal evacuation to take place.
	132 (1)				☑	The respondent does not believe plasterboard can adequately protect combustible construction. The respondent believes consideration of the building's size and height alone does not account for the risk that combustible construction poses for: i) Escape without external assistance, ii) Protection of escape routes iii) Prevention of fire and smoke spreading within the building. The respondent draws attention to a guidance document by the SFPE on evacuation times for persons in care homes: The respondent believes this guidance should be considered in the guidance provided for care homes.
Planning for progressive horizontal evacuation (2.35)	132 (1)				☑	The respondent believes it is not possible to consider lobbies and refuges to be "protected areas" in combustible construction.

Planning for progressive horizontal evacuation (2.40)	129 (1)	☑				The respondent believes that the potential horizontal evacuation shown encourages evacuation to a dead-end situation. BRE Global is unable to see what the respondent considers to be unacceptable.
Fire detection and alarm (2.41)	132 (1)				☑	The respondent believes further consideration is required as to the extent of coverage of fire smoke detection and alarm in care homes. The respondent believes the detection in combustible construction (particularly in care homes) should extend to the roof void.
Sprinkler systems (2.46)	135 [V1:(3)]				☑	The respondent believes further consideration is required as to the extent of coverage of fire smoke detection and alarm in care homes. The respondent believes the detection in combustible construction (particularly in care homes) should extend to the roof void.
	64 (1)			☑		The respondent argues for the removal of option to remove self-closers if sprinklers are provided.
	84 (1)				☑	The respondent suggests that the provision of sprinklers is mandatory in ALL care homes, irrespective of size and irrespective of the escape strategy being progressive horizontal evacuation or simultaneous evacuation. BRE Global interprets the respondent's comment to mean sprinklers should not be a compensatory feature (e.g. for the removal of self-closing devices or wards being large i.e. with more than 10 beds).
	125 [V1 : (4)]				☑	The respondent specifically refers to the sprinklering of 'common situation' buildings at a lower threshold.
	129 (1)				☑	The respondent believes self-closing devices are a vital fire safety feature, particularly so when sprinkler systems actuate. The respondent believes the trade off in section 2.46 (a) is unacceptable.
	132 (1)				☑	The respondent suggests sprinklers in combustible construction must be provided in roof spaces.

Section 3: Design for vertical escape

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
External escape stairs (3.32)	34 (1)			☑		The respondent asks whether fire performance of external escape routes and external escape staircases, relative to the fire performance of external walls, can be reviewed. Stair in Building A can be vulnerable to a fire in adjacent Building B because of unprotected area allowances. Similarly, an external escape stair or escape route from building A can be vulnerable to a fire spreading through or over the wall of building A.
	134 (1)	☑				The respondent believes that the final exit shown in diagram 3.4 should be annotated to require fire resistance (integrity and insulation) to a height of 1.1m above floor level.
	142 (1)	☑				The respondent asks whether the guidance relating to building heights 3.32(b & d) can be overcome by covering the stair. The respondent asks whether occupancy numbers would make a difference and whether the height restrictions applies to all use classes or whether there is nuances between the classes.
	34 (4)				☑	The respondent believes the guidance on walls adjacent to external escape stairs and external escape routes need to be reconsidered. Fire threats can also arise from outside the building – not just the inside.
Access lobbies and corridors (3.34)	38 (1)	☑		☑		Respondent's view is that currently inadequate regard is given to preventing smoke ingress into a single stair. BRE Global's view is that designers and AHJs go to the Smoke Control Association (SCA) guide for practical guidance. BRE Global notes the guide is not endorsed in AD B. There may be a case for further consideration of some of its themes (more work research)
Access lobbies and corridors (3.35)	134 (1)				☑	The respondent suggests that the guidance on ancillary accommodation is severely lacking and that better guidance can be found in BS 9991 and BS 9999 (table 29). The respondent suggests that the definition of ancillary accommodation also needs careful

						consideration and suggests wording as part of the consultation response.
Exits from protected stairways (3.36)	134 (1)	☑				The respondent suggests it is frequently misunderstood that the final exit from a stairway should be via a protected lobby. The respondent suggests that a diagram showing the route from the base of the stair to the final exit being suitably protected.
Use of space within protected stairways (3.38)	134 (1)	☑		☑		The respondent asks for clearer guidance on what is and is not acceptable regarding service risers where services can rise in building of different use classes and why they cannot. The respondent suggest the following wording riser shafts should not be accessed from a single stairway or the final exit corridor serving it. Riser shafts can be accessed from common corridors provided they are enclosed and separated from the corridor by fire resisting instruction. The respondent also gives suggestions for fire resistance of the doors accessing the riser shaft and iron mongering.
Gas service and installation pipes in protected stairways (3.39)	134 (1)	☑		☑		The respondent asks for clearer guidance on what is and is not acceptable regarding service risers where services can rise in building of different use classes and why they cannot. The respondent suggest the following wording riser shafts should not be accessed from a single stairway or the final exit corridor serving it. Riser shafts can be accessed from common corridors provided they are enclosed and separated from the corridor by fire resisting instruction. The respondent also gives suggestions for fire resistance of the doors accessing the riser shaft and iron mongering.
Basement stairs (3.40)	134 (1)				☑	The respondent says that the principle described in AD B whereby stairs should not continue down to a basement (single stairway buildings) is misunderstood. The respondent suggests a phrase "imperforate separation" would prevent designers from offering screen and fire door separation. The respondent suggests diagrams should be provided to make the guidance of 3.40 and 3.41 clearer. The respondent suggests there is great pressure desire to continue single stairs down to basement levels. The respondent believes that ventilated lobbies may be worth considering. The respondent believes that certain small single stair buildings might be allowed to continue down to basements subject to certain criteria being met (lobby +0.4m^2)

						BRE Global believes that these suggestions would require further consideration (research) and ultimately guidance diagrams and text would clarify matters.
Basement stairs (3.41)	134 (1)				☑	The respondent says that the principle described in AD B whereby stairs should not continue down to a basement (single stairway buildings) is misunderstood. The respondent suggests a phrase "imperforate separation" would prevent designers from offering screen and fire door separation. The respondent suggests diagrams should be provided to make the guidance of 3.40 and 3.41 clearer. The respondent suggests there is great pressure desire to continue single stairs down to basement levels. The respondent believes that ventilated lobbies may be worth considering. The respondent believes that certain small single stair buildings might be allowed to continue down to basements subject to certain criteria being met (lobby +0.4m^2) BRE Global believes that these suggestions would require further consideration (research) and ultimately guidance diagrams and text would clarify matters.

Section 7: Loadbearing elements of structures

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Introduction to B3	125 (3)				☑	The respondent believes the contribution combustible construction makes to a fire event needs to be reviewed. The respondent believes the provisions for stability of such buildings for a 'reasonable period' are not considering the contribution of the combustible structure to a growing fire. The respondent notes that fire resistances in tall buildings were based on total burnout of the contents of a compartment and collapse of the structure or part of the structure onto adjacent structures is not considered. The respondent also points out that in some buildings loadbearing walls may also be compartment walls. The respondent points to condition 2: Table B3: Appendix B which allows a reduction in period of fire resistance for load bearing walls, which are also

						compartment walls See condition 6(a): Table B3: Appendix B to 60 minutes. The respondent believes that if a compartment wall contains combustible elements it is probable, they will contribute to the fire load and that all this needs review/correcting. Lastly, the respondent points to the 'robustness of the structural fire protection – noting that where fire protection can be damaged or poorly installed additional margins of safety should be provided'.
	132 (3)				☑	The respondent believes the intention of B3(1) cannot be met using combustible construction for any residential, other residential or institutional use adopting anything other than a simultaneous evacuation strategy. The respondent believes this applies where the building is above single storey height. The respondent draws attention to a fire in an Extra Care facility in England (timber frame) which occurred in the afternoon on 8th August 2019. Media accounts of this fire described how the public assisted with the evacuations of residents (i.e. carrying residents to safety). The respondent believes this was a near miss. The respondent highlights a fire that occurred in an assisted living complex in a suburb of New York (reported in the media to be a timber frame building) that occurred at 01:00 on 23rd March 2021. In the New York suburb fire, a firefighter and a resident died and two other firefighters were injured. The respondent believes the assumption that buildings constructed from cross laminate timber will self-extinguish, once a char layer is formed is a 'flawed assumption'. The respondent also points to defensive firefighting strategies being adopted by Fire and Rescue Services on discovering that a building is timber framed. The respondent says it is probable that once Fire and Rescue Services know all occupants are accounted for, they will adopt a defensive firefighting strategy (i.e. one where no firefighters are committed inside the building). In the respondent's view, such a strategy can lead to the loss of a building which is 'devastating for residents, who have lost their home and all of their possessions'. The respondent also says that in England 'we have been fortunate […] not to have had fire fatalities […] in a combustible structure and I believe that this [a fatality] is reasonably foreseeable.' The respondent believes that Requirement B3(4) cannot be met when building with combustible construction. The respondent points to fire spread within cavities and cites a research project: Timber Frame 2000 (TF2000) where following testing one

						day, fire spread within the cavity of a timber frame building. The respondent believes fire in combustible construction has the potential to spread unseen through cavities and makes it unsuitable for complying with B3(4). The respondent also cites fires that allegedly occurred outside of timber framed buildings and spread into the building via cavities.
	60 (4)	☑				The respondent seeks clarity on what constitutes excessive spread of fire over walls and roofs
Fire resistance standard (7.1)	75 (3)				☑	The respondent seeks to draw attention to pre-panelised or modular construction where the walls are all loadbearing. Can there be better guidance fire resistance of modular buildings where walls are interdependent?
	100 (3)				☑	The respondent believes guidance must be provided on the limitations of building with 'CLT and that when modelling[sic] fires with CLT that the structure itself is included in the fire load.'
	125 (3)				☑	The respondent believes the contribution combustible construction makes to a fire event needs to be reviewed. The respondent believes the provisions for stability of such buildings for a 'reasonable period' are not considering the contribution of the combustible structure to a growing fire. The respondent notes that fire resistances in tall buildings were based on total burnout of the contents of a compartment and collapse of the structure or part of the structure onto adjacent structures is not considered. The respondent also points out that in some buildings loadbearing walls may also be compartment walls. The respondent points to condition 2: Table B3: Appendix B which allows a reduction in period of fire resistance for load bearing walls, which are also compartment walls See condition 6(a): Table B3: Appendix B to 60 minutes. The respondent believes that if a compartment wall contains combustible elements it is probable, they will contribute to the fire load and that all this needs review/correcting. Lastly, the respondent points to the 'robustness of the structural fire protection – noting that where fire protection can be damaged or poorly installed additional margins of safety should be provided'.
	132 (3)				☑	The respondents view is that B3(4) cannot be met by use of plasterboard to protect combustible construction. The respondent believes the use of plasterboard is flawed as: 'plasterboard can be

						damaged by trades, maintenance personnel, by physical impact or by water damage'.
	146 (3)				☑	The respondent believes for patient safety in single storey hospitals the REI should be 60 minutes fire resistance not 30 minutes. The respondent believes building occupancy and evacuation strategy need to be considered.
Exclusions from the provisions for elements of structure (7.3)	140 (3)	☑				The respondent suggests the guidance of 7.3(a)(I need additional clarity. BRE Global suggests a link from section 7.3 to Diagram D6 with a note to the diagram that the 'roof' as shown does/does not need fire resistance.
	142 (3)			☑		The respondent asks that loading galleries etc are included in the definitions. BRE Global believes it would be better to see diagrams of each 'structure' excluded from being considered an 'element of structure.
	145 (3)	☑				The respondent believes that when plant goes on a flat roof, a common interpretation is that the roof becomes a loadbearing element. The respondent points to HTM 05-02 which states that if the roof serves as a plant room then it will need fire resistance. The respondent asks for this to be clarified in AD B Section 7.3. Lastly, the respondent points to the danger to firefighters (in a building during a fire) of not doing so if plant is on a roof and the roof collapses in a fire.

Section 8: Compartmentation/sprinklers

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Sprinklers (8.14)	37(3)	☑	☑			The respondent asks for guidance on water mist.
	81 (3)	☑	☑			Respondent asks for guidance on water mist. Can BS 8458 and 8489 be considered and referenced in AD B?
	142 (3)		☑			The respondent asks for guidance on whether water mist systems can be used.

	26 (3)				☑	The respondent believes that buildings with storeys 30m above ground level should have a requirement for sprinkler systems in place especially with a sleeping risk prevalent.
	27 (3)				☑	The respondent makes the point that the AD B should not encourage omission of sprinklers, and refers to table B4 and the note (in bold) to note 2 of that table and Section 18.11. Note 2 of table B4 relates to common parts in residential buildings not needing sprinkler coverage.
	59 (3)				☑	The respondent also sees that 'fire suppression technology is broader than ever before' and is being used to demonstrate alternative provision. The respondent asks for AD B guidance to be clearer on when suppression is and is not suitable when considering alternative provision. Finally, the respondent asks how far one is required to go to establish if water pressure can be guaranteed at night and in face of supply network leaks – how can (should) this be included in AD B guidance?
	132 (3)				☑	The respondent believes sprinklers: 'should be required within combustible structures providing residential accommodation (including in roof voids) to offer an additional layer of protection against internal fires'. The respondent believes: 'residential premises are not appropriate to be constructed of combustible construction'.
	119 (3)				☑	The respondent points to this section of guidance and notes it specifically excludes car parks for light vehicles from needing sprinkler protection. The respondent says that […] the increased use of plastics in car design/manufacture and the advent of EVs and rechargeable batteries, the likelihood of hotter and longer duration fires and car fire spread is much greater'. The respondent suggests guidance on fire safety provisions in car parks is out of touch with developments in car design and needs re-think.
	130 (3)				☑	The respondent suggests little thought has gone into consideration of the quantity or water needed 'fight a fire […] involving modern electrically powered vehicles.' The respondent suggests it is time for 'mandatory provision of water suppression systems in [both] open sided and enclosed car parks.'
	134 (3)				☑	The respondent believes there is a 'misunderstanding regarding, residential, commercial, commercial and underground car parks [and] what standard [of water suppression] should take preference'. Consideration

						should be given to what installation is appropriate to a small commercial unit. Residential type up to a certain floor area?
	142 (3)				☑	The respondent asks for consideration to be given to water suppression in car parks. The respondent acknowledges the use of car stackers may introduce a heightened level of fire load over a conventional car park and asks for guidance in this regard.
	145 (3)				☑	The respondent believes there should be an upper limit on car park sizes and cites changes in manufacturing of cars – bodywork and fuel sources. The respondent suggests sprinklers may be a consideration. The respondent also points to the large Kings Dock fire in Liverpool December 2017 and the Merseyside Fire and Rescue recommendation that the 15 minute requirement needs review. The respondent believes the assumption that a fire in a car rarely spreads beyond the adjacent car to be outdated and in need of review. BRE Global notes the fire at Stavanger Airport Norway (January 2020) destroying 300 cars and leading to partial collapse over five floors and the closure of the airport. The RISE report of this fire concluded batteries were not cited as a major contributory factor. There was no compartmentation strategy for the building. Wind on the afternoon was 25 miles per hour gusting to 3 miles per hour. The fire was believed to be 'conventional'.

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Junction of compartment wall or compartment floor with other walls (8.22)	132 (3)	☑				The respondent asks if there is test evidence of fire-stopping systems that have been tested between 'solid timber (e.g. CLT) wall and timber floor[s]'.
	143 (3)				☑	The respondent asks for more clarity regarding fire stopping in relation to an external wall such as a curtain wall. The respondent asks what does section 8.22 mean in relation to a curtain wall, which is typically not fire resisting? Should the fire stop be

						against an aluminium transom? If a fire stop interfaces with a spandrel, should the fire stop be to the back of the spandrel or to the back of the outer face material of the spandrel? BRE Global notes that other respondents have asked that Diagram 9.1 be brought up to date.
	144 (3)				☑	The respondent makes two points: i) section 8.22 requires that the junction between a compartment floor and an external wall will be fire-stopped – 'to maintain the compartmentation' and ii) section 8.23 requires that an external wall with no fire resistance, must nevertheless be restrained to 'reduce' wall movement away from the floor. BRE Global observes that if 'reduce' is not defined, industry/regulators will adopt different standards. The respondent asks the question: '[…] If the external wall has no fire resistance, how could the compartmentation be[sic] maintained[…]?' The respondent notes that very similar junction details can be treated in very different ways by the project engineer and building control and there is no degree of certainty as to what is required. The respondent is of the view that in a fire, glass breakage of a full height curtain wall [bounding the compartment of fire origin] is likely, and fire is then likely to 'propagate from one compartment to that above (leap frog)'. The respondent asks whether AD B should consider if the provision of sprinklers (plus slab edge linear joint seals – where the test is between concrete lintels to BS EN 1366-4) would achieve equivalence. The respondent suggests the alternative is a spandrel (how high to be agreed…) with the correct fire resistance, is required? In the case of the spandrel, the respondent suggests the junction could be tested to BS EN 1364-4 but this would need to be accepted and referenced in AD B. BRE Global observes that perhaps paragraph 8.23 should make it clear that: '[…] an external wall with no fire resistance…' means an external wall with no requirement for fire resistance on account of adequate boundary separation alone. The guidance could then go on to describe whether there is an expectation that a spandrel, with adequate fire resistance, is required or not and what test standard applies.
Junction of compartment wall or compartment floor with	143 (3)	☑				The respondent asks for diagrams to illustrate what is required where the "junction" is between a compartment floor/wall and an external wall.

other walls (8.23)						
	144 (3)				☑	The respondent makes two points: i) section 8.22 requires that the junction between a compartment floor and an external wall will be fire-stopped – 'to maintain the compartmentation' and ii) section 8.23 requires that an external wall with no fire resistance, must nevertheless be restrained to 'reduce' wall movement away from the floor. BRE Global observes that if 'reduce' is not defined, industry/regulators will adopt different standards. The respondent asks the question: '[…] If the external wall has no fire resistance, how could the compartmentation be[sic] maintained[…]?' The respondent notes that very similar junction details can be treated in very different ways by the project engineer and building control and there is no degree of certainty as to what is required. The respondent is of the view that in a fire, glass breakage of a full height curtain wall [bounding the compartment of fire origin] is likely, and fire is then likely to 'propagate from one compartment to that above (leap frog)'. The respondent asks whether AD B should consider if the provision of sprinklers (plus slab edge linear joint seals – where the test is between concrete lintels to BS EN 1366-4) would achieve equivalence. The respondent suggests the alternative is a spandrel (how high to be agreed…) with the correct fire resistance, is required? In the case of the spandrel, the respondent suggests the junction could be tested to BS EN 1364-4 but this would need to be accepted and referenced in AD B. BRE Global observes that perhaps paragraph 8.23 should make it clear that: '[…] an external wall with no fire resistance…' means an external wall with no requirement for fire resistance on account of adequate boundary separation alone. The guidance could then go on to describe whether there is an expectation that a spandrel, with adequate fire resistance, is required or not and what test standard applies.
Junction of compartment wall with roof (8.25)	60 (3)	☑		☑		The respondent believes diagram 8.2 should be clarified to specifically identify where the 'roof covering' layer is. This also seems confusing when considering composite insulated panels.
	59 (3)				☑	The respondent believes former diagram 30 (now 8.2) should be expanded to include detailing for steel framed buildings. BRE Global does not see that diagram 8.2 discriminates between masonry timber or steel. BRE Global notes however the precautionary

						wording in diagram 8.2 that '[...] protection of […] members […] may be needed to delay distortion[…]' and observes that there is no further guidance in AD B on when such protection will and will not be necessary. BRE Global also notes that there is no guidance on the role deflection heads should play in this regard? Research may be needed to look at how deflection heads contribute to delay distortion.
	110 (3)				☑	The respondent believes diagram 8.2 should be clarified to specifically identify where the 'roof deck and roof covering' layers are located, and what material can and cannot be taken across the head of a compartment wall. The respondent believes this guidance should be more clearly split into detailing for flat roofs and detailing for pitched roofs.
	112 (3)				☑	The respondent believes classification standard BS EN 13501-5 and CEN/TS 1187 ' […] do not replicate real-life roof constructions[…] where [roof] configurations traverse compartment walls.' The respondent believes 'penetrations and other non-planar features are not included in this test' and should be. The prevalence of warm roof and different constructions would be reason to consider the guidance in Diagram 8.2 anew. The respondent believes the diagrams in 8.2 should show pitched roof and flat roof constructions separately. The respondent also considers combustible insulation is vulnerable to a fire from within the building and that the issue of whether combustible construction should carry over a compartment line or not needs to be reviewed. BRE Global sees this as an area of research to provide indicative or full-scale evidence. Lastly, the respondent believes that a roof of a 'higher-risk' building (such as a hospital, care home, school, sheltered housing, commercial warehouse, and entertainment complex) greater than 11m in height should be classified as A2-s1,d0 or better, to EN 13501-1 but there is no reasoning advanced for this.
Junction of compartment wall with roof (8.26)	60 (3)	☑		☑		The respondent believes diagram 8.2 should be clarified to specifically identify where the 'roof covering' layer is. This also seems confusing when considering composite insulated panels.
	59 (3)				☑	The respondent believes former diagram 30 (now 8.2) should be expanded to include detailing for steel framed buildings. BRE Global does not see that diagram 8.2 discriminates between masonry timber or steel. BRE Global notes however the precautionary wording in diagram 8.2 that '[...] protection of […]

						members […] may be needed to delay distortion […]' and observes that there is no further guidance in AD B on when such protection will and will not be necessary. BRE Global also notes that there is no guidance on the role deflection heads should play in this regard? Research may be needed to look at how deflection heads contribute to delay distortion.
	110 (3)				☑	The respondent believes diagram 8.2 should be clarified to specifically identify where the 'roof deck and roof covering' layers are located, and what material can and cannot be taken across the head of a compartment wall. The respondent believes this guidance should be more clearly split into detailing for flat roofs and detailing for pitched roofs.
Junction of compartment wall with roof (8.27)	110 (3)				☑	The respondent believes diagram 8.2 should be clarified to specifically identify where the 'roof deck and roof covering' layers are located, and what material can and cannot be taken across the head of a compartment wall. The respondent believes this guidance should be more clearly split into detailing for flat roofs and detailing for pitched roofs.
Junction of compartment wall with roof (8.29)	131 (3)					The respondent asks that an exception be made in Diagram 8.2 b for inverted roofs on a concrete deck. BRE Global understands the point being made but suggests that service penetrations e.g. SVPs or RWDPs on either side of a compartment wall may then become critical considerations. Perhaps further research is needed into the likelihood of fire spread via plastic vent pipes if the insulation of an inverted roof is inherently combustible. Alternatively, service penetrations could be non-combustible? The respondent asks if the title of Diagram 8.2a could be changed to 'other building or compartment'. BRE Global observes that this would be an improvement. The respondent also believes the title of Diagram 8.2b should be 'mixed use including residential'. BRE Global notes however that the intention for this diagram is to offer a reduced standard for small residential buildings below 15m tall. A residential building with a 5th floor, could trigger the need to follow diagram 8.2a. If the building is mixed use at less than 15m height then it would be for the designer to argue that flats exist on the top storey and therefore they wish to use diagram 8.2b.
	143 (3)					The respondent asks that Diagram 8.2 b for inverted roofs on a concrete deck be clarified. BRE Global understands the point being made but suggests that

						service penetrations e.g. SVPs or RWDPs on either side of a compartment wall may then become critical considerations. Perhaps further research is needed into the likelihood of fire spread via plastic vent pipes if the insulation of an inverted roof is inherently combustible. Alternatively, service penetrations could be non-combustible? The respondent asks if Diagram 8.2 a should read 'other building or compartment'? The respondent asks if Diagram 8.2b should be reworded to 'mixed use' or similar in this volume. BRE Global notes however that the intention for this diagram is to offer a reduced standard for small residential buildings below 15m tall. A residential building with a 5th floor, could trigger the need to follow diagram 8.2a. If the building is mixed use at less than 15m height, then it would be for the designer to argue that flats exist on the top storey and therefore they wish to use diagram 8.2b.

Section 9: Cavities

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Cavities (9.1)	51 (3)	☑				The respondent does not elaborate, but makes a statement that 'designers are confused' as to what is expected regarding cavity barriers. Although nothing articulated, BRE Global cannot discount a comment such as this.
	63 (4)				☑	The respondent asks for better guidance on what to do with all the different cavities in facades. The respondent also asks about different shaped facades. BRE Global agrees that there should be research into fire spread over surfaces of walls which lean, twist, step and stagger, have recesses and are curved. These walls are likely to behave differently to flat facades.
	66 (4)	☑				The respondent suggests the subject of cavity barriers and curtain walls is not understood and asks that AD B address matters – including firestopping at slab edge, how to treat windows punch windows and gasket seals.

Provision of cavity barriers (9.2)	11 (3)			☑		Diagram 9.1 to be more appropriate for multi-level buildings with storey height unitised facades.
	80 (3)			☑		The respondent makes the point that 38mm timber and 0.5mm steel may not achieve 30:15 E:I performance. BRE Global notes a previous respondent saying generic solutions should be reviewed in favour of tested details?
	113 (3)	☑				The respondent would welcome more annotated diagrams showing what is and is not acceptable within protected shafts. The respondent would welcome more annotated diagrams on where cavity barriers and cavity closers are required.
	88 (3)				☑	The respondent trades in rainscreen and insulated render and believes the guidance on cavity barriers in 9.2, 9.3 and 9.10 to be confusing and not representative of their systems. The respondent points out that the cavity for rainscreen is typically 50mm or more and must be open at top and bottom and at cladding joints while the cavity behind render systems is between 15 and 25mm and there for drainage only.
	100 (3)				☑	The respondent believes the fire stopping detail in Diagram 9.1 should have fire stopping continuing from the slab edge to the external face rather than a fire stop and cavity barrier. BRE Global observes that if Diagram 9.1 is to be revisited, because respondents want it to be current for 2021 and beyond, then such detailing would be part of the review. The respondent also suggests that fire breaks are required on the external face of a building at floor levels to prevent vertical fire spread from floor to floor. BRE Global believes this would be a piece of research into the role of spandrel panels and horizontal ‘fins’ in prevention of vertical fire spread.
	131 (3)				☑	The respondent provided drawings of modern facades and suggests Diagram 9.1 needs revision to make it relevant to modern façade design. In the respondent’s view the current diagram wrongly assumes a hybrid cavity wall/curtain wall interface exists. The respondents diagrams are available for review. In summary they show: 1) masonry cavity wall with backing wall off a slab, 2) curtain wall running past slab 3) open rainscreen with backing wall off a slab

						and 4) precast concrete panel outer leaf with only dry lining to inside. 5) double skin curtain walls.
	143 (3)				☑	The respondent believes the diagram is unsuitable for modern facades in non-domestic properties and suggest it should be reworked. In modular construction there are concerns over the inability to inspect cavity barriers over the lifetime of the building, their life expectancy when exposed to weather. Are they fundamentally the right approach if they become part of the protective solution for loadbearing functions of a building? Section 9.2 also states that cavity barriers should not be confused with fire-stopping details but this is at odds with section 9.13.
	78 (4)				☑	This respondent points to the need for more guidance on complex facades with complex grids, sub-grids and multiple voids. What is and is not required regarding cavity barriers and their INSTALLATION?
	115 (4)				☑	The respondent says that Diagram 9.1 just does not relate to modern facades. The respondent asks if: 'cavity barriers are required in rainscreen cavities, where open jointed rainscreen cladding is applied to the outside face of unitised curtain wall systems?' The respondent also asks if 'unitised curtain systems require fire stops within the depth of the profile at slab edge?'
	120 (4)				☑	The respondent asks about when a cavity is too small to worry about closing it.
	136 (4)				☑	The respondent asks for clarity on modern facades and spandrel areas both curtain walls and where the backing wall is made from light gauge steel structure and in the latter case, what should be the make-up be?
Pathways around fire-separating elements- Junctions and cavity closures (9.3)	112 (2)				☑	The respondent states that all penetrations through all external walls (where required to be fire rated) and roofs (which may require to be fire rated). The respondent suggests that fires can enter cavities and currently guidance only draws attention to penetrations occurring around windows and doors. The respondent is thinking along the lines of ducts, grills, pipes, cables and rooflights.
	88 (3)				☑	The respondent trades in rainscreen and insulated render and believes the guidance on cavity barriers in 9.2, 9.3 and 9.10 to be confusing and not representative of their systems. The respondent points out that the cavity for rainscreen is typically 50mm or more and must be open at top and bottom and at cladding joints while the cavity behind render

						systems is between 15 and 25mm and there for drainage only.
	112 (3)				☑	The respondent states that all penetrations through all external walls (where required to be fire rated) and roofs (which may require to be fire rated). The respondent suggests that fires can enter cavities and currently guidance only draws attention to penetrations occurring around windows and doors. The respondent is thinking along the lines of ducts, grills, pipes, cables and rooflights.
	131 (3)				☑	The respondent believes the definition of a cavity needs to be addressed including 'extensive cavities'. The respondent points to the voids in mullions and asks if they are too small to consider cavity barriers. BRE Global asks if, given their location, they should not be overlooked and perhaps research needed?
	143 (3)				☑	The respondent believes the definition of a cavity needs to be addressed including 'extensive cavities'. The respondent points to the voids in mullions and asks if they are too small to consider cavity barriers. The respondent points to internal "chambers" of an aluminium extrusion that may pass locally to a compartment floor – and postulates if there is a cross sectional area that can be considered for negligible/small cavities. BRE Global asks if, given their location, they should not be overlooked and perhaps research needed? Lastly, the respondent says the guidance suggests a cavity barrier is needed at window head, compartment floor and window cill, all of which could all be within 500mm of each other. Is this necessary?
	144 (3)				☑	The respondent suggests Diagram 9.1 should be revised to show curtain wall constructions such as those referenced in the product standard BS EN 13830. The purpose of showing such walls would be to address what to do with the cavities (which may be very small, small, medium and large) in different systems. The respondent also acknowledges the guidance in AD B that 'cavity barriers should close the edge of windows' but states 'every single panel could be a glazed element'. The respondent believes a diagram showing what is expected with regard to edges of windows in order to close cavities is needed. The respondent asks for detailed research into the different types of curtain wall: i) where the cavity is 500mm to 800mm wide and walkway grilles occur at each floor and ii) where the cavities are within the box frames of the 'system' and

						iii) large hollow sections run horizontally or vertically as detailing. BRE Global notes that curtain walls could be designed for use on Institutional buildings, residential colleges and halls or residence (to which Regulation 7(2) applies). Accordingly, the consideration of 'windows', 'spandrels' and 'opaque infill panels' needs resolution. Sometimes the panels have opaque infills.
	146 (3)				☑	The respondent says the sentence before NOTE is counter to the understanding that cavity barriers need to achieve 30:15 E:I fire rating. The respondent points to notes in Diagram 9.2 stating: 'Materials used to close the cavity in this arrangement do not need to achieve a specific performance in relation to fire resistance.' The respondent notes that it is particularly important to close cavities with correctly rated cavity barriers if the cavity has material in it achieving class B-s3, d2 or worse.
	120 (4)				☑	The respondent asks about when a cavity is too small to worry about closing it.
	87 (4)				☑	The respondent asks for better guidance on modern façade/balcony junctions. The industry does not know where/if cavity barriers should be placed. BRE Global believes this may be a subject for further research.

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Construction and fixings for cavity barriers (9.13)	112 (3)				☑	The respondent points out that test standards including 'EN 1366-4 for linear fire stops, EN 1363-1 for open state cavity barriers and CEN/TS 1187 (together with classification standard EN 13501-5) for roof coverings […] fall unacceptably short of determining whether the systems tested will perform adequately in real-life'. The respondent also suggests that: 'Ahead of the outcome of the recent DLUHC review of test standards for safety critical construction products, it might be appropriate to include reference in AD B to industry and draft EN test standards […] e.g. the ASFP test method for open state cavity barriers, Technical Guidance Document 19.'

	87 (4)				☑	The respondent points out that they provide barriers behind cladding, but the barriers are not tested for use on curtain wall/unitised systems. BRE Global believes this may need to be the subject of future research or work.
Construction and fixings for cavity barriers (9.14)	80 (3)					The respondent makes the point that 38mm timber and 0.5mm steel may not achieve 30:15 E:I performance. BRE Global notes a previous respondent saying generic solutions should be reviewed in favour of tested details?
	143 (3)					'Prescribed materials can be used as cavity barriers in a stud wall, partition or around an opening. 'It is recognised that these materials do not necessarily achieve the normal performance required of cavity barriers' this sentence undermines the need for cavity barriers to achieve 30:15 designation.
	144 (3)		☑			The respondent asks if the list in 9.14 could be expanded to include concrete and glass fibre reinforced concrete.
	136 (4)	☑				The respondent asks for clarity on performance requirements for cavity barriers. The sentence before NOTE in section 9.14 suggests one can waive the requirement if it will not achieve 30:15. The respondent asks if timber 38mm x 38mm is an option?
	112 (3)				☑	The respondent points out that test standards including 'EN 1366-4 for linear fire stops, EN 1363-1 for open state cavity barriers and CEN/TS 1187 (together with classification standard EN 13501-5) for roof coverings […] fall unacceptably short of determining whether the systems tested will perform adequately in real-life'. The respondent also suggests that: 'Ahead of the outcome of the recent DLUHC review of test standards for safety critical construction products, it might be appropriate to include reference in AD B to industry and draft EN test standards […] e.g. the ASFP test method for open state cavity barriers, Technical Guidance Document 19.'
	119 (3)				☑	The respondent observes that the guidance on materials not necessarily achieving the 30:15 performance standard is at odds with the direction of travel of fire safety. Specify 30:15 and stick to it appears to be the respondent's request.
	131 (3)				☑	The respondent identifies the sentence before the NOTE (in bold) as undermining the technical advice elsewhere relating to cavity barrier performance. BRE

						Global notes this sentence was introduced to the AD B 2019 edition and is causing confusion where there was no confusion before.
	146 (3)				☑	The respondent says the sentence before NOTE is counter to the understanding that cavity barriers need to achieve 30:15 E:I fire rating. The respondent points to notes in Diagram 9.2 stating: 'Materials used to close the cavity in this arrangement do not need to achieve a specific performance in relation to fire resistance.' The respondent notes that it is particularly important to close cavities with correctly rated cavity barriers if the cavity has material in it achieving class B-s3, d2 or worse.
Construction and fixings for cavity barriers (9.15)	143 (3)	☑				The respondent suggests that this section should acknowledge open state cavity barriers (required to comply with AD C and AD L) are legitimate exceptions to the general rule that barriers should be tight fitting or else junctions should be fire stopped. BRE Global notes that the standard of testing open state cavity barriers is suggested by other respondents to need consideration and further research. It may be worth reviewing the Scottish guidance see Scottish Technical handbook. Clause 2.4.1 states in relation to open state cavity barriers that it is recognised some smoke will spread beyond the cavity barrier at the incipient and early fire growth phases prior to the intumescent material reacting to heat but this is not considered to be a major concern as the cavity is ventilated to atmosphere.
	112 (3)				☑	The respondent notes that cavity barriers should be well fitted, and that fire test methods/research may be needed to consider structural movement affecting fire safety-critical components for certain MMC during transit and subsequent assembly. The respondent suggests as an alternative, that AD B might either include guidance on the provision of enhanced on-site inspection for pre-installed safety-critical components or require such components to be installed on-site.
	131 (3)	☑				The respondent suggests that this section should acknowledge open state cavity barriers (required to comply with ADC and ADL) are legitimate exceptions to the general rule that barriers should be tight fitting or else junctions should be fire stopped. BRE Global notes that the standard of testing open state cavity barriers is suggested by other respondents to need consideration and further research.

Construction and fixings for cavity barriers (9.16)	140 (3)	☑		☑		The respondent asks for clarity on how to 'fix' cavity barriers like the polyethylene sleeved cavity barriers for masonry cavity walls.
	112 (3)				☑	The respondent notes that cavity barriers should be well fitted, and that fire test methods/research may be needed to consider structural movement affecting fire safety-critical components for certain MMC during transit and subsequent assembly. The respondent suggests as an alternative, that 'AD B might either include guidance on the provision of enhanced on-site inspection for pre-installed safety-critical components or require such components to be installed on-site.
	143 (3)				☑	The respondent points out that the guidance expects that cavity barriers should be fixed so their performance is unlikely to be made ineffective. The respondent asks what this means in relation to rainscreen panels that may melt and fail within the 30-minute integrity requirement for a cavity barrier?
	120 (4)				☑	The respondent asks about when a cavity is too small to worry about closing it.
	87 (4)			☑	☑	The respondent points out that they provide barriers behind cladding, but the barriers are not tested for use on curtain wall/unitised systems. BRE Global believes this may need to be the subject of future research or work. The respondent points to the use of adhesives in sandwich panels and asks whether there should be more guidance on system testing so that the effect of the adhesive can also be considered.
Openings in cavity barriers (9.17)	131 (3)				☑	The respondent suggests that penetrations of cavity barriers should be 'exempt' where facades incorporate bracketry for outer skins or balconies. BRE Global suggests this may need to be the subject of further research. BRE Global also notes previous respondents point to the 'zone' in a façade, at or about ceiling level, close to party walls, as being likely to be congested. Such congested zones may include façade and balcony bracketry and ventilation duct penetrations (in close proximity – on each side of the compartment wall). The zone should be given further consideration.
	143 (3)				☑	The respondent believes the guidance is too prescriptive given cavity barriers in external walls are likely to be penetrated by bracketry for external skins and balcony fixings. A detailed review of this detail is needed.

Section 11: Special provisions for car parks

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Special provisions for car parks (11.1)	38 (1)				☑	Greater emphasis needed on preventing smoke entering stairwells in all buildings to preserve efficacy of stairs and therefore the role they play in life safety. Car parks need much more consideration, both in terms of ventilation relative to size of car park and fire load, associated with modern vehicles. Rates of ventilation are too low. A societal 'shift' is coming. This 'shift' is not a probable it is more certain than that. Fire safety guidance needs to stay one step ahead. Much better guidance for coach parks and loading bays is required. The general coverall of 10 air changes is not suitable in all instances. The fire load for a single lorry in the SCA guide is 40MW and the fire load for a car is 8MW. BS 7346: Part 7: 2013 specifically excludes loading bays and coach parks. More guidance needed. As car parks and loading bays are common building features and AD B should provide guidance. The testing of and validation of systems once installed is not adequate and it needs to be.
	124 (1)				☑	Car parks need much more consideration, to accommodate modern vehicle technology, charging areas and transformer rooms. BRE Global believes this may require reconsideration of warning and escape (in case of fire) and therefore ventilation provisions in such car parks may well need to be reconsidered. BRE Global also believes there may need to be a discussion around fire loads associated with electric vehicles and general construction of modern vehicles. Factors may also include whether car stacking systems are proposed and if so how complex? A societal 'shift' is coming. This 'shift' is not a probable it is more certain than that. Fire safety guidance needs to stay one step ahead.
	124 (3)				☑	The respondent points to car parks for light vehicles and the period of fire resistance. Does the Kings Dock fire December 2017, show that fire resistance of car

						parks (including service penetrations) needs research and review?
	130 (3)				☑	The respondent suggests little thought has gone into consideration of the quantity or water needed 'fight a fire […] involving modern electrically powered vehicles.' The respondent suggests it is time for 'mandatory provision of water suppression systems in [both] open sided and enclosed car parks'.
	132 (3)				☑	The respondent believes it unwise to have cars (fuel source) under a combustible structure, where the structure is only protected by plasterboard: 'seems inappropriate, given the amount of fuel loading that modern cars provide'. Further, the respondent believes over reliance on plasterboard to provide the fire resistance appears inappropriate given how it can be damaged by water egress, impact or trades, or how it can be poorly installed.
	142 (3)				☑	The respondent asks for consideration to be given to water suppression in car parks. The respondent acknowledges the use of car stackers may introduce a heightened level of fire load over a conventional car park and asks for guidance in this regard.
	145 (3)				☑	The respondent believes there should be an upper limit on car park sizes and cites changes in manufacturing of cars – bodywork and fuel sources. The respondent suggests sprinklers may be a consideration. The respondent also points to the large Kings Dock fire in Liverpool December 2017 and the Merseyside Fire and Rescue recommendation that the 15 minute requirement needs review. The respondent believes the assumption that a fire in a car rarely spreads beyond the adjacent car to be outdated and in need of review. BRE Global notes the fire at Stavanger Airport Norway (January 2020) destroying 300 cars and leading to partial collapse over five floors and the closure of the airport. The RISE report of this fire concluded batteries were not cited as a major contributory factor. There was no compartmentation strategy for the building. Wind on the afternoon was 25 miles per hour gusting to 36 miles per hour. The fire was believed to be 'conventional'.
Open-sided car parks- Natural ventilation (11.2)	123 (3)				☑	The respondent says that modern basement car parks are not square on plan, accordingly it is not possible to achieve ventilation on 'two opposite walls'. The respondent is concerned that many car parks will have large areas up to 50% with limited or no ventilation.

						The question being posed is better guidance is required.
	124 (3)				☑	The respondent points to car parks for light vehicles and the period of fire resistance. Does the Kings Dock fire December 2017, show that fire resistance of car parks (including service penetrations) needs research and review?
	134 (3)				☑	The respondent believes nether system is used these days and that CFD modelling and impulse fan induced air movement is used to justify 'air flow equivalency'. The respondent believes there is a misunderstanding that 'the objective under B3 and B5 is for 'post-fire venting''. The respondent says the intention of using impulse fans is to ensure a good distribution of air flow without stagnant zones, but this is not clear in current AD B. The respondent says that the guidance needs to be updated to show what designers should achieve when using jet fans. The respondent believes a very clear statement is required as to what the intention is when using impulse fans. The respondent is clear that it is used to prevent fire spread under B3 and assist firefighting access under B5. In the respondent's view impulse fans are not provided for post fire venting, although, in BRE Global's opinion, they are probably used for this too. In the respondent's opinion the 10 Air changes per hour 'principle' is not based on evidence. The number of air changes must be sufficient to 'lift the smoke layer' to enable a view of the seat of the fire. The respondent offers the following based on Greater London Council guidance from Section 20 buildings, that if a car park is over 3,000m^2 it will require between 2 and 10 air changes to lift the smoke layer. The question to resolve is how many air changes suit different sized and configured car parks. BRE Global agrees with the respondent that car park fires have changed since this principle was established. In BRE Global's view, a consideration will be how smoke will/will not move when the car park has multiple levels, multiple recesses, down-stand beam obstructions and hanging pipes and ducts. Added to the mix is the guidance in section 11.2(e) that all materials used in the construction of car parks should be A1 rated but what is meant about the finish applied to a floor? What will be the effect of lining the ceiling of the upper most level with thermal insulation and can thermoset insulation be used? Revised guidance is definitely needed.

Mechanical ventilation (11.5)	119 (3)			☑		The respondent suggests that mechanical extract points serving car parks has led to concern. Vents have been found to be located below windows to occupied flats. This finding has led to concern that fire in a car park could easily spread between compartments.
	123 (3)			☑		The respondent says that modern basement car parks are not square on plan, accordingly it is not possible to achieve ventilation on 'two opposite walls'. The respondent is concerned that many car parks will have large areas up to 50% with limited or no ventilation. The question being posed is better guidance is required.
	38 (1)				☑	Greater emphasis needed on preventing smoke entering stairwells in all buildings to preserve efficacy of stairs and therefore the role they play in life safety. Car parks need much more consideration, both in terms of ventilation relative to size of car park and fire load, associated with modern vehicles. Rates of ventilation are too low. A societal 'shift' is coming. This 'shift' is not a probable it is more certain than that. Fire safety guidance needs to stay one step ahead. Much better guidance for coach parks and loading bays is required. The general coverall of 10 air changes is not suitable in all instances. The fire load for a single lorry in the SCA guide is 40MW and the fire load for a car is 8MW. BS 7346: Part 7: 2013 specifically excludes loading bays and coach parks. More guidance needed. As car parks and loading bays are common building features and AD B should provide guidance. The testing of and validation of systems once installed is not adequate and it needs to be.
	124 (1)				☑	Car parks need much more consideration, to accommodate modern vehicle technology, charging areas and transformer rooms. BRE Global believes this may require reconsideration of warning and escape (in case of fire) and therefore ventilation provisions in such car parks may well need to be reconsidered. BRE Global also believes there may need to be a discussion around fire loads associated with electric vehicles and general construction of modern vehicles. Factors may also include whether car stacking systems are proposed and if so how complex?

						A societal 'shift' is coming. This 'shift' is not a probable it is more certain than that. Fire safety guidance needs to stay one step ahead
	134 (3)				☑	The respondent believes nether system is used these days and that CFD modelling and impulse fan induced air movement is used to justify 'air flow equivalency'. The respondent believes there is a misunderstanding that 'the objective under B3 and B5 is for 'post-fire venting''. The respondent says the intention of using impulse fans is to ensure a good distribution of air flow without stagnant zones, but this is not clear in current AD B. The respondent says that the guidance needs to be updated to show what designers should achieve when using jet fans. The respondent believes a very clear statement is required as to what the intention is when using impulse fans. The respondent is clear that it is used to prevent fire spread under B3 and assist firefighting access under B5. In the respondent's view impulse fans are not provided for post fire venting – although, in BRE Global's opinion, they are probably used for this too. In the respondent's opinion the 10 Air changes per hour 'principle' is not based on evidence. The number of air changes must be sufficient to 'lift the smoke layer' to enable a view of the seat of the fire. The respondent offers the following based on Greater London Council guidance from Section 20 buildings, that if a car park is over 3,000m^2 it will require between 2 and 10 air changes to lift the smoke layer. The question to resolve is how many air changes suit different sized and configured car parks. BRE Global agrees with the respondent that car park fires have changed since this principle was established. In BRE Global's view a consideration will be how smoke will/will not move when the car park has multiple levels, multiple recesses, downstand beam obstructions and hanging pipes and ducts. Added to the mix is the guidance in section 11.2(e) that all materials used in the construction of car parks should be A1 rated but what is meant about the finish applied to a floor? What will be the effect of lining the ceiling of the upper most level with thermal insulation and can thermoset insulation be used? Revised guidance is definitely needed.

Section 12: Resisting fire spread over external walls

Section	Respondent	The respondent seeks?				BRE Global distillation of comment
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
External surfaces (12.5)	12 (4)	☑				In BRE Global's view the example given is covered in Diagram D6: Height to top storey and Regulation 7(4) is clear on what the ban applies to. However... perhaps this point speaks to this... B4 (1) requires adequate resistance to the spread of fire from one building to the next. Section 12.15 refers to buildings triggering Regulation 7(4) but Table 12.1 says that for buildings <18m (tall) and >1.0m (from a boundary) that NO PROVISIONS apply.
	34 (4)			☑		The respondent observes that the statement “no provisions” is at odds with the Schedule 1 relevant requirement “The external walls of the building shall adequately resist the spread of fire over the walls …” Guidance needed.
	93 (4)				☑	The respondent asks if table 12.1 is acceptable to recommend 'no provisions'? BRE Global believes this might be intended to mean 'determine performance on a case by case basis.'
	119 (4)				☑	The respondent points to the guidance in table 12.1 and suggests 'no provisions' is at odds with the relevant requirement at paragraph 12.1.
	131 (4)				☑	The respondent points out that Note 1 says all materials must comply but notes Regulation 7(3) disapplies many items from the Regulation 7(2) 'requirement'. BRE Global observes that Regulation 7(3) says window frames (not windows) and glass do not need to achieve A1 or A2-s1,d0 and nor do door frames and doors. BRE Global wonders, what about glass in doors? The respondent points out that there needs to be a debate on laminated glass in windows and on balconies in balustrades. BRE Global observes that an interpretation of Table 10.1 for the [non] 'relevant buildings' is that they still need windows and doors to achieve B or C for the glass and membranes and electrical installations etc.

						The respondent is suggesting 10.5 and 10.6 and Table 10.1 need clarification.
	132 (4)				☑	The respondent is strongly of the opinion that the guidance of 'no provisions' for buildings of combustible construction, with a top storey at less than 18m above Ground Level, is seriously flawed. The respondent believes this needs review.
	139 (4)				☑	The 'no provisions' requirement for buildings with a floor at 18m above Ground Level seems wrong.
	143 (4)				☑	The respondent says there should be a minimum requirement for 'other buildings' with a storey at <18m above Ground Level and >1.0m to a boundary. The respondent believes 'no provisions', in Table 12.1 cannot be right? The respondent would like to see the 'exemptions' of Regulation 7(3) captured in Table 12.1 too. The respondent asks for clarification on what constitutes the 'outermost external material' where a composite material is being considered.
Materials and products (12.6)	109 (4)	☑				The respondent says the Volume 2 guidance should be specific for Volume 2 and not a rehash of Volume 1 guidance. The respondent suggests either making it clear that the guidance relates to institutional use, halls of residence & residential college or it should be more targeted to all other use classes other than residential.
	120 (4)	☑				The respondent asks for: 'clarity on when European Commission Decision 96/603/EC is an acceptable method for demonstrating materials are Non-Combustible. E.g. Laminated glass. The respondent asks if it could be clarified if EPDM seals are acceptably defined as seals or membranes? Lastly the respondent asks if the CWCT SFE Technical guidance for interpretation in relation to the external walls and specified attachments of relevant buildings in England can be referenced in AD B or if sections of it can be added to AD B.
	24 (4)				☑	The respondent believes the 18m trigger on external walls needing to be A1 or A2 and the 11m trigger requiring sprinklers in residential buildings leaves a gap in control. The respondent believes Regulation 7(2) should apply to buildings over 11m not over 18m.
	80 (4)	☑		☑		The respondent believes paragraph still needs to be re-written. BRE Global understands the purpose of Regulation 7(2) is to emphasise the mandatory nature. Accordingly, the respondent may be satisfied if the

						word 'should' was substituted for something expressing the mandatory requirement e.g. 'must' AND that at the end of the paragraph it states Paragraph 0.9 does not apply to this single paragraph.
	88 (4)				☑	The respondent says their business is having difficulty getting insulated render systems (to defined standard EAD 040083-00-0404) accepted. BRE Global cannot determine if the respondent's comment relates to systems on buildings >18m or <18m above ground. If greater than 18m then this perhaps spells out the need for clearer guidance in AD B (i.e. in paragraph 12.6 specifically). Perhaps the paragraph needs to connect with Regulation 7(2). BRE Global observes the ONLY route to compliance (where the building falls under Regulation 7(4) is for all elements to be classified as A1 or A2-s1,d0 and paragraph 0.9 does not apply in this instance. The respondent points out that plastic corner beads should be exempted under Regulation 7(3). Review Insulated render systems to see if there can be clarity going forward.
	107 (4)				☑	The respondent does not agree with either the prescription of Regulation 7(2) or the guidance of paragraph 12.6. The respondent believes every wall type should be tested large-scale to BS 8414-1 (or 2):2020 to determine suitability.
	110 (4)				☑	The respondent addresses Regulation 7(2) and 7(3) as needing review. BRE Global notes this lies outside the scope of this project. The respondent believes 7(2) provides a 'deemed to satisfy' route. However, BRE Global notes the mandatory 'intent' of 7(2). The respondent suggests they would like for there to be an alternative route using BS 8414. BRE Global notes there is no such 'alternative route' where a floor is at >18m but there can be for a building with a floor at <18m. See comment at end relating to paragraph 0.9, which might clarify matters. The respondent mentions: i) That walls built using A1 and A2 could fail a BS 8414 test if suitably badly built. ii) A diagram would assist with understanding of 10.15, showing walkway/decks, terraces or roof gardens and if any could be considered not to be a specified attachment? Respondent seeks clarity on interpreting when is a wall not a wall - specifically a roof-side parapet

						upstand. Is it exempt from the requirement to be constructed from A1 or A2 material? The respondent seems to be suggesting a diagram would help understand what can/cannot be done with DPCs in different wall build-ups and a 'table' would be useful to consider a hierarchy of risk in buildings with different wall constructions.
	111 (4)				☑	The respondent is critical that spandrels and side panels cannot be glazed in laminated glass. BRE Global observes that the Regulation 7(3) disapplies window frames and glass from the need to comply with Regulation 7(2). The guidance of AD B 12.16d is for laminated glass in spandrels and infills to comply with Regulation 7(2). The respondent asks if this could be reviewed believing an alternative, toughened glass, is unsuitable. The respondent believes toughened glass presents a danger with panes potentially 'falling-out' or 'exploding,' as a result of nickel sulphide inclusions. The respondent asks that this Part K danger is weighed against the risk/likelihood of laminated glass being a significant mechanism for fire spread. The respondent then asks a similar question regarding laminated glass in balustrades on balconies on buildings >18m tall. BRE Global notes that there is now one glass balustrade design that complies... perhaps other systems are in development? The counter argument is that toughened glass is not as safe as laminated or that no further systems are in development.
	131 (4)				☑	The respondent says this paragraph is still not clear. The respondent says it can be interpreted as '...all components except...' or '...only the specific components listed'. It is noted this is the old 12.7 with the title changed - omitting use of word insulation. BRE Global believes to make this clearer, perhaps the guidance should be placed under headings Relevant Buildings and a separate heading All Other buildings . The respondent asks if the CWCT and SFE guide can be recommended in the AD B or if extracts from it can be lifted into AD B.
	143 (4)				☑	The respondent points to this paragraph (the old paragraph 12.7) as still causing much disquiet in the industry. The respondent points out that the paragraph remains ambiguous, on issues like exempt materials for non-relevant buildings. If a material enjoys exemption when considered as a relevant building, when it comes to considering non-relevant

						buildings they will not enjoy exemption and therefore what standard applies. The respondent writes that the paragraph should be clear that it does not apply to 'relevant buildings'. BRE Global notes perhaps the paragraph was intended to apply to '...all materials used in the construction of an external wall (as defined in Appendix A) ...but not including X Y or Z, should achieve the fire performance classification given in Table 12.1'. The respondent suggests wording like filler and core and spandrel need to be reconsidered and more carefully defined. The respondent asks for the CWCT and SFE: 'Technical guidance for interpretation in relation to the external walls and specified attachments of relevant buildings in England' to be referenced in AD B or for extracts from it to be added to AD B.
	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. This test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity. The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.13 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplications (see Regulation 7(3)) be disapplied for such 'other buildings'. Lastly, the respondent points to three pieces of guidance in AD B 12.16 and asks if membranes can be looked at again. They must continue to exclude damp. The respondent also asks for clearer evaluation of laminated glass and considers if it really should be banned and lastly the respondent asks if more guidance on thermal breaks can be provided. Curtain walls can be more than 2 storeys high.
	146 (4)				☑	The respondent believes all buildings in the High risk category should be class A1 or A2. Hospitals at 17+m wrapped in combustible construction is an unacceptable risk.

Materials and products (12.7)	109 (4)			☑		The respondent asks for more meaningful guidance on green walls. The document 'Fire Performance Green Roofs and Walls' offers only very general guidance.
	119 (4)				☑	The respondent asks for more definitive guidance on green wall technologies. The guidance in 12.7 is to refer to the DCLG guidance document. BRE Global notes the DCLG document does not give specific guidance. It also concludes by saying further research is needed.

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Materials (12.11)	112 (4)	☑				The respondent provided a full response touching on considerations and suggestions. Considerations: i) The 'ban' should be on high rise and high-risk buildings. ii) The Hackitt Review and the Public Inquiry have both identified a shortfall in competence in design, construction ongoing maintenance of buildings. Add to this, combustible materials, and there is then a strong likelihood of large fire/fire spread. If you remove combustibles this lessens the risk. Suggestion: i) Assembly buildings should be included in the ban. ii) the trigger height should reduce from 18m to 11m (a height which is WITHIN Fire and Rescue Service's capabilities and NOT at the limit of their capabilities). BRE Global notes the respondent states "AD B still allows BS 8414 - BR 135 route for buildings over 18m". BRE Global also notes the respondent asks that the 'ban' should apply to many uses that the ban already applies to under Regulation 7(4)(a) ii and iii. BRE Global also notes that the respondent believes an 11m trigger or a fourth storey trigger (whichever the lower) should apply. BRE Global assumes the respondent means if the building has a fifth storey or fourth floor level? In summary: A diagram with footnote(s) would help make clearer the buildings to which guidance clause 12.11 applies and what Regulation 7(2) means.

						Perhaps include a note that for the purposes of this paragraph alternative approaches (as per paragraph 0.9) disapplies.
	113 (4)	☑				The respondent seems to say that because Regulation 7(3)g disapplies membranes from needing to achieve an A1 or A2-s1,d0 they can then achieve an E or F rating. BRE Global observes that this might be resolved in a diagram and a note(s). Note(s) could make it clear there that AD B provides practical guidance on how to meet the functional requirement- not the regulations. The respondent also says B_{ROOF}(t4) products are hard to find.
	136 (4)		☑			The respondent asks that Relevant Buildings be broadened to include hotels, primarily because of the variety of resource (physical building fabric and management). The respondent also points to Relevant Buildings and asks can there be guidance on mixed use buildings.
	146 (4)				☑	The respondent believes all buildings in the High-risk category should be class A1 or A2. Hospitals at 17+m wrapped in combustible construction is an unacceptable risk.
Materials (12.13)	83 (4)				☑	The respondent appears to be asking when is a seal a membrane, and if an EPDM 'seal' is no wider than 250mm, can it be considered a window perimeter seal? The respondent acknowledges EPDM is likely to have a reaction to fire classification to BS EN 13501-1 (Class E). The respondent first asks if a 'seal' can be up to 150mm wide, for sheathing board joint seals, before exploring if spray applied PU foams are also acceptable to be classed as 'seals' or 'sealants'? The respondent also asks about an interpretation of adhesives, used for bonding breather membranes, and whether the adhesive and the membrane should be tested together as a 'system'? The respondent asks that consideration be given the CWCT and IFE Technical guidance document for interpretation in relation to the external walls and specified attachments of relevant buildings in England to either be referenced in AD B or, to have extracts lifted from it, into AD B. BRE Global notes the difficulty in interpretation of much of 12.16 in the light of Regulation 7(3)(g) and (h). BRE Global notes the request for clarity on width of seals. If window fixing foam is considered a seal up to 150mm wide, this is something which would definitely require detailed consideration and probable further guidance.

	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. This test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity. The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.13 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplications (see Regulation 7(3)) be disapplied for such 'other buildings'.
Additional considerations (12.15)	12 (4)	☑				In BRE Global's view the example given is covered in Diagram D6: Height to top storey and Regulation 7(4) is clear on what the ban applies to. However... perhaps this point speaks to this... B4 (1) requires adequate resistance to the spread of fire from one building to the next. Section 12.15 refers to buildings triggering Regulation 7(4) but Table 12.1 says that for buildings <18m (tall) and >1.0m (from a boundary) that NO PROVISONS apply.
Additional considerations (12.16)	7 (4)	☑		☑		This respondent says there are structural (fire rated) thermal breaks. Remove the exemption.
	80 (4)	☑		☑		The respondent appears to be making three points relating to this paragraph: i) laminated balustrades... cannot there be more clarity on these where >18m? ii) when is a seal a membrane [BRE Global interprets, this could apply to HDPE 'weathering sheets'. Question: Are these weathering sheets membranes or secondary 'seals'?] iii) specifically, 10.15 (e) can the restriction on the thermal break rising no more than 2 compartments be clarified?
	87 (4)	☑				The respondent asks about thermal breaks and where examples can be cited/shown. The respondent goes on to ask about the use of laminated glass and

						wonders if laminated glass can be used in privacy screens on otherwise non-combustible balcony constructions. BRE Global believes it cannot be used in privacy screens because those screens would be part of the specified attachment.
	90 (4)	☑				The respondent says the guidance on wall roof junctions is no longer clear. When is a wall not a wall? Is the roof-side parapet upstand exempt from the requirement to be constructed from A1 or A2 material? BRE Global observes there may be merit in clarifying this and whether dormers are walls or a type of roof(?) clarify Appendix A: Key terms.
	109 (4)	☑				The respondent says the Volume 2 guidance should be specific for Volume 2 and not a rehash of Volume 1 guidance. The respondent suggests either making it clear that the guidance relates to institutional use, halls of residence & residential college or it should be more targeted to all other use classes other than residential. Regulation 7(2) requirement: i) Terraces and inset balconies costly/difficult to achieve with non-combustible insulations. iv) Laminated glass balustrades should be reconsidered. The safety from falling must have higher 'status'. If balcony is A1 or A2 will the laminated glass alone give rise to fire spread risk?
	113 (4)	☑				The respondent seems to say that because Regulation 7(3)g disapplies membranes from needing to achieve an A1 or A2-s1,d0 they can then achieve an E or F rating. BRE Global observes that this might be resolved in a diagram and a note(s). Note(s) could make it clear there that AD B provides practical guidance on how to meet the functional requirement- not the regulations. The respondent also says B_{ROOF}(t4) products are hard to find.
	125 (4)	☑				The respondent says the guidance should deal with minor components by citing the maximum volume of combustible material per m^2... or other metric.
	127 (4)	☑				The respondent says customers and regulators do not understand brick slip facade systems. The respondent believes their product is Euroclass A1 to EN 13501 and because the BBA certificate states there is no restriction for its use (relative to boundaries). The respondent believes the whole system (comprising backing wall sheathing and plasterboard and the slips) complies. Regulators and

						others are challenging the system. BRE Global suggests that a couple of diagrams may assist in understanding of relevant, non-relevant buildings.
	149 (4)	☑				The respondent asks what to do with air vents in external walls and rainwater down pipes which pass through cavity barriers, are they exempt?
	8 (4)				☑	The respondent asks: 'When is a wall not a wall?' The respondent also asks if the roof-side parapet upstand is exempt from the requirement to be constructed from A1 or A2 material? BRE Global notes: if it is considered there is merit in clarifying this then also clarify Appendix A: Key terms It may be that a new paragraph and diagram would help clarify how upstands should be viewed for purposes of B4 and the 'ban' on combustibles. BRE Global observes these 'upstands' may need to be considered in different contexts... i.e., i) inaccessible roofs or ii) accessible roofs or iii) places where persons can assemble or iv) roofs over which persons can escape. DLUHC may also wish to consider upstands (walls) in terms of height and length run in different combinations and whether reference to existing lines of compartmentation is relevant.
	12 (4)				☑	This respondent asks: 'When is a wall not a wall?' Also: 'Is the roof-side parapet upstand exempt from the requirement to be constructed from A1 or A2 material?' BRE Global notes: if there is merit in clarifying this then there is also merit in clarifying Appendix A: Key terms.
	144 (3)				☑	The respondent suggests Diagram 9.1 should be revised to show curtain wall constructions such as those referenced in the product standard BS EN 13830. The purpose of showing such walls would be to address what to do with the cavities (which may be very small, small, medium and large) in different systems. The respondent also acknowledges the guidance in AD B that 'cavity barriers should close the edge of windows' but states 'every single panel could be a glazed element'. The respondent believes a diagram showing what is expected with regard to edges of windows in order to close cavities is needed. The respondent asks for detailed research into the different types of curtain wall: i) where the cavity is 500mm to 800mm wide and walkway grilles occur at each floor and ii) where the cavities are within the box frames of the 'system' and

						iii) large hollow sections run horizontally or vertically as detailing. BRE Global notes that curtain walls could be designed for use on Institutional buildings, residential colleges and halls or residence (to which Regulation 7(2) applies). Accordingly, the consideration of 'windows', 'spandrels' and 'opaque infill panels' needs resolution. Sometimes the panels have opaque infills.
	83 (4)				☑	The respondent appears to be asking when is a seal a membrane, and if an EPDM 'seal' is no wider than 250mm, can it be considered a window perimeter seal? The respondent acknowledges EPDM is likely to have a reaction to fire classification to BS EN 13501-1 (Class E). The respondent first asks if a 'seal' can be up to 150mm wide, for sheathing board joint seals, before exploring if spray applied PU Foams are also acceptable to be classed as 'seals' or 'sealants'? The respondent also asks about an interpretation of adhesives, used for bonding breather membranes, and whether the adhesive and the membrane should be tested together as a 'system'? The respondent asks that consideration be given the CWCT and IFE Technical guidance document for interpretation in relation to the external walls and specified attachments of relevant buildings in England to either be referenced in AD B or, to have extracts lifted from it, into AD B. BRE Global notes the difficulty in interpretation of much of 12.16 in the light of Regulation 7(3)(g)and (h). BRE Global notes the request for clarity on width of seals. If window fixing foam is considered a seal up to 150mm wide, this is something which would definitely require detailed consideration and probable further guidance.
	106 (4)				☑	The respondent asks that the benefits in preventing fatalities arising from falls following impact are weighed against the instances where laminated glass is the root cause of external fire spread where balconies are otherwise constructed entirely from A1 and A2 s2,d0 materials.
	110 (4)				☑	The respondent addresses Regulation 7(2) and 7(3) as needing review. BRE Global notes this lies outside the scope of this project. The respondent believes 7(2) provides a 'deemed to satisfy' route. However, BRE Global notes the mandatory 'intent' of 7(2). The respondent suggests they would like for there to be an alternative route using BS 8414. BRE Global notes there is no such 'alternative route' where a floor is at >18m but there can be for a building with a floor at <18m. See

						comment at end relating to paragraph 0.9, which might clarify matters. The respondent mentions: i) That walls built using A1 and A2 could fail a BS 8414 test if suitably badly built. ii) A diagram would assist with understanding of 10.15, showing walkway/decks, terraces or roof gardens and if any could be considered not to be a specified attachment? The respondent seeks clarity on interpreting when is a wall not a wall - specifically a roof-side parapet upstand. Is it exempt from the requirement to be constructed from A1 or A2 material? The respondent seems to be suggesting a diagram would help understand what can/cannot be done with DPCs in different wall build-ups and a 'table' would be useful to consider a hierarchy of risk in buildings with different wall constructions.
	111 (4)				☑	The respondent is critical that spandrels and side panels cannot be glazed in laminated glass. BRE Global observes that the Regulation 7(3) disapplies window frames and glass from the need to comply with Regulation 7(2). The guidance of AD B 12.16d is for laminated glass in spandrels and infills to comply with Regulation 7(2). The respondent asks if this could be reviewed believing an alternative, toughened glass, is unsuitable. The respondent believes toughened glass presents a danger with panes potentially 'falling-out' or 'exploding,' as a result of nickel sulphide inclusions. The respondent asks that this Part K danger is weighed against the risk/likelihood of laminated glass being a significant mechanism for fire spread. The respondent then asks a similar question regarding laminated glass in balustrades on balconies on buildings >18m tall. BRE Global notes that there is now one glass balustrade design that complies... perhaps other systems are in development? The counter argument is that toughened glass is not as safe as laminated or that no further systems are in development.
	131 (4)				☑	The respondent observes the following: i) we must review membranes and EPDMs. The class B membranes are not available to do the same job as EPDMs. BRE Global notes that if damp is not excluded the wall may suffer under part A and Part C.

						ii) window (including coloured glass), infill, spandrels all need to be defined so that designers have more confidence in industry and regulators' interpretation(s). iii) the thermal breaks in paragraph 12.16 (e) need to be defined and placed in diagram(s).
	136 (4)				☑	The respondent asks for more guidance on waterproofing and insulation material from below ground level to 250mm above ground level; upstands walls or roofs; membranes or seals and the role of EPDMs; what is the approach for anti-drumming and material separation membranes as these are not available in class A2? The respondent asks for more guidance on combustible fixings (High performance resin impregnated wall ties, Insulation retaining clips, rainscreen polyurethane or silicone-based adhesives). Rainscreen adhesives are widely used for cladding application (to bond reinforcing mesh or stiffeners or as primary fixing type). The respondent asks for further clarity around exemption Regulation 7(3)(h). The respondent asks about the link/clash with Part L and exceeding Part L (e.g. the London Plan). The respondent asks for clarity on what types of glazing systems are included in this definition. We need clarifications on the glazing retention means allowed. Examples: glazing retained by pressure plates, glazing beads, toggle fixings, structural bonding, bolted glass, cable facades. The respondent asks about double skin facades. Can fully framed balustrades be exempt? What about other ancillary items for masonry construction, for example cavity closers (polythene-sleeved mineral wool and air bricks and weep hole inserts/covers.
	144 (4)				☑	The respondent says it is an urgent need to devise a test for fire performance of curtain walls. The test should be along the lines of BS EN 8414. This test needs a set of acceptance criteria akin to BR 135 acceptance criteria. The respondent also says the testing would prove, beyond doubt whether cavity barriers or fire stopping is needed and testing will inform on their fixity. The respondent points to full height glued and laminated mullions in curtain walls. Regulation 7(3) would appear to allow this. The respondent asks if the CWCT/SFE guide could be basis for guidance in AD B? The respondent points to paragraph 10.13 and asks for clarification that if the walls were acceptable, formed of a material with fire performance classification B-s3, d2, could the list of disapplications

						(see Regulation 7(3)) be disapplied for such 'other buildings'. Lastly, the respondent points to three pieces of guidance in AD B 12.16 and asks if membranes can be looked at again. They must continue to exclude damp. The respondent also asks for clearer evaluation of laminated glass and considers if it really should be banned and lastly the respondent asks if more guidance on thermal breaks can be provided. Curtain walls can be more than 2 storeys high.

AD B Volume 2 section B5

6.9.1 BRE Global concluded that similar themes were emerging in Section B5 Volume 2 as those that had emerged in Volume 1. A decision was made not to provide a detailed interpretation of every point but merely to map the paragraphs raised in respondent's comments. BRE Global concluded that B5 provisions in Volume 1 and Volume 2 needed a review; a point subsequently born out of the workshop session on the subject.

Regulation 38

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Intention to Regulation 38	150 (0)		☑			Respondent suggests Regulation 38 should cross refer design decisions and changes to specification (during the construction phase) to specific paragraphs in AD B - golden thread.
	50 (38)			☑		The respondent appears to be suggesting that ventilation systems require far greater detail at commissioning/ handover stage for building owner to understand how such a fire safety system operates and all the relevant key features of the system. Much of this was covered under respondent's comment in B1 and B1 - Volume 1.
	51 (38)	☑				BRE Global interprets the respondent's comment as asking the question should Regulation 38 information be provided for all forms of building work (including alterations and extensions) and material changes of use.
	130 (38)	☑				BRE Global interprets the respondent's comment as asking the question should Regulation 38 information be provided for all forms of building work (including

						alterations and extensions) and material changes of use.
	45 (3)				☑	The respondent asks for greater 'bars to entry' for designers of buildings. Tougher rules on quality/content of submissions and tougher rules on golden thread and Regulation 38.
	24 (38)				☑	The respondent suggests Regulation 38 is ineffective because there is no legal bar to prevent the issue of a completion certificate. The Respondent suggests a link between Regulation 38 and Gateway 3 (as originally proposed by Hackitt)
	58 (38)				☑	The respondent suggests Regulation 38 is ineffective because there is no 'control' over it.
	86 (38)				☑	The respondent suggests Regulation 38 information needs to be submitted to the Building Control Body to be 'checked'.
	119 (38)				☑	The respondent suggests Regulation 38 needs more work. Who supplies the information and who it is for? Is it destined for the premises information box? BRE Global observes the respondent writes about responsibilities but does not raise directly who should be checking the information.
	121 (38)				☑	The respondent suggests Regulation 38 is not being observed. BRE Global observes there is currently no 'enforcement' element to the process.
	142 (38)				☑	The respondent suggests Regulation 38 is not being enforced. A previous respondent said 'nice idea...' The respondent suggests that when designs change there must be a review of the strategy. BRE Global observes this lies outside of Regulation 38.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. The respondent therefore believes Regulation 38 information may be incorrect and is often unchecked.
Fire safety information (19.1)	50 (38)			☑		The respondent appears to be suggesting that ventilation systems require far greater detail at commissioning/ handover stage for building owner to understand how such a fire safety system operates and all the relevant key features of the system. Much of this was covered under respondents' comment in B1 and B1 - Volume 1.

Essential information (19.3)	32 (38)	☑				The respondent appears to suggest that industry is unaware as to what they should provide to comply with Regulation 38. BRE Global notes however that considerable information is now provided under Section 19.3 to 19.6.
	100 (38)	☑		☑		The respondent suggests more guidance is needed on the exact information needed to satisfy Regulation 38.
	16				☑	Respondent says mobility impairment is the most underdeveloped part of AD B. BRE Global observes this respondent has 'ticked' every possible section i.e., to indicate that mobility impairment issues are underdeveloped across B1 to B5. To capture their concern, the comment has been repeated the point in S 0, B1, B5 and Regulation 38 to capture intent.
	132 (38)					The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6 (d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. The respondent therefore believes Regulation 38 information may be incorrect and is often unchecked.
Essential information (19.4)	149 (1)				☑	The respondent believes the guidance is insufficient for dealing with the evacuation of persons with a disability(s). The respondent believes reliance on PEEPs may give a false sense of assurance that persons with a disability are catered for in all

						situations. PEEPs will require staff that have been trained in "manual handling" of persons from a wheelchair to some other form of evacuation chair. The respondent suggests this cannot be a dignified form of escape, and doubts whether the number of trained staff will be available at all times the building is occupied.
	132 (38)				☑	The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6 (d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
Additional information for complex buildings (19.6)	149 (1)				☑	The respondent believes the guidance is insufficient for dealing with the evacuation of persons with a disability(s). The respondent believes reliance on PEEPs may give a false sense of assurance that persons with a disability are catered for in all situations. PEEPs will require staff that have been trained in "manual handling" of persons from a wheelchair to some other form of evacuation chair. The respondent suggests this cannot be a dignified form of escape, and doubts whether the number of trained staff will be available at all times the building is occupied.
	132 (38)				☑	The respondent is of the opinion that if the building is constructed from combustible construction then this makes the importance of the fire protection paramount. The respondent believes the fire protection measures and their ongoing maintenance must be included in the Regulation 38 information. The respondent also believes that if the structure is combustible then this should automatically 'trigger' it being considered a 'complex '. Under this circumstance the respondent believes Paragraph 17.6

						(d) needs to be more explicit as to the details of the fire protection measures and their ongoing maintenance. The respondent believes all 'complex' buildings must have a fire strategy that considers ongoing obligations for maintenance of the fire protection layers. The respondent also believes tenants need to be made aware of their obligations to maintain and report damage to the fire protection layers.
	149 (38)				☑	The respondent believes that fire engineers are considered an unnecessary expense after RIBA stage 4. The respondent says that changes to the design after stage 4 or 5 seldom get be passed to the fire engineer to consider. The respondent therefore believes Regulation 38 information may be incorrect and is often unchecked.

Appendix B

Section	**Respondent**	**The respondent seeks?**				**BRE Global distillation of comment**
		Clarity	Inclusion	More definitive guidance	To fill a gap in technical content	
Appendix B- Performance of materials, products and structures	6	☑	☑			The respondent states that there was information in Table A8 Table A8 removed now. Can it be included in Appendix B? Item relocated from B2 where respondent originally placed it. Respondent felt it was clear before, but now it is open to interpretation. BRE Global's view: 1992 edition Note 3 to Table A8 stated: plasterboard (painted or not, or with a PVC...) etc achieved Class 0 (National class). 2000 edition Note 3 to Table A8 stated: plasterboard (painted or not with a PVC...) What did the expression "with a PVC facing" refer to?
	8	☑	☑			BRE Global interprets the point on Section 12 in V1 and Section 14 in V2 to equate to former Table A5.

	12	☑	☑			BRE Global interprets the point on Section 12 in V1 and Section 14 in V2 to equate to former Table A5. It is noted that there is no equivalent table in Appendix B.
	59 (2)				☑	The respondent's comments under Volume1 apply equally here (availability of standards referred to, complexity, more comprehensive guidance which is easier to understand). BRE Global is not aware of surface spread of flame requirements being more difficult to understand where they relate to shop fit outs and interior design.
	62 (2)			☑		The respondent believes a culture change is required where the presumption should be to provide test evidence (BS or BS EN standards in English) rather than what the respondent believes to be irrelevant test standards (often not translated into English).
	98 (2)			☑		The respondent appears to be asking that AD B is more explicit about the need for test certificates accompanying the reaction to fire tests - particularly how items are mounted and what the substrate was. BRE Global notes the "Field of Application" is a key part of the test documentation and perhaps AD B could state that certificates must include full information on the testing not selected parts.
	113 (2)	☑	☑			The respondent points to Information previously being in Table A8. Table A8 is now removed. Can the contents of table A8 be reinstated? See comments under Volume 1.
	113 (3)	☑				The respondent would like it to be made clear that insulated plasterboard should not be specified to provide fire resistance to walls requiring fire resistance, unless it has been tested.
	87 (4)		☑	☑		The respondent asks about coatings. BRE Global assumes the question is about the need to check colour and coating composition. BRE Global also notes the former guidance relating to: '…check[ing] to ensure that [products are]suitable, adequate and applicable to the construction to be used. Small differences in detail, such as thickness, substrate colour, form[…]' has been removed from the current guidance.
	136 (4)	☑				The respondent asks for definitions to resolve "grey areas" including, Roof upstands, below DPC vertical areas, ground interfaces, back of parapets, soffits, Internal lining and VCL, Rooftop balustrades and plant screens.

	15				☑	This respondent sees FR and RTF as being different tests which somehow need to be considered together. Can we somehow combine them? BRE Global's example to exhibit this comment could be... ... A masonry cavity wall could achieve 2hr fire resistance and perform well in Rtf test(s) conversely, ... a composite panel may (?) achieve 2hr fire resistance but perform poorly in RTF test(s) BRE Global's observation is it could be possible to use existing fire resistance tests, for example, to indicate reaction to fire properties.
	132 (1)				☑	The respondent suggests that AD B is intended for common structures/building types and that combustible construction is incompatible with this principle. The respondent does not believe plasterboard can adequately protect combustible construction. The respondent believes consideration of the building's size and height alone does not account for the risk that combustible construction poses for: i) Escape without external assistance, ii) Protection of escape routes iii) Prevention of fire and smoke spreading within the building.
	103 (2)				☑	The respondent believes that fire resistance of a wall (and perhaps fire spread across the surface of the wall) should include the effect of penetration in the wall such as electrical sockets and switches (including their faceplates). BRE Global observes there may be merit in suggesting walls should be tested for fire resistance with one or more sockets set into the wall - the walls fire performance. BRE Global is unaware of the need to consider the faceplate as contributing to the surface spread of the flame.
	100 (3)				☑	The respondent believes guidance must be provided on the limitations of building with CLT and that when modelling fires with CLT that the structure itself is included in the fire load.
	119 (3)				☑	The respondent asks for guidance on how to protect/not protect mass timber structures. What is and is not acceptable?
	124 (3)				☑	The respondent points to car parks for light vehicles and the period of fire resistance. Does the Kings Dock fire December 2017, show that fire resistance of car

						parks (including service penetrations) needs research and review?
	125 (3)				☑	The respondent believes the contribution combustible construction makes to a fire event needs to be reviewed. The respondent believes the provisions for stability of such buildings for a 'reasonable period' are not considering the contribution of the combustible structure to a growing fire. The respondent notes that fire resistances in tall buildings were based on total burnout of the contents of a compartment and collapse of the structure or part of the structure onto adjacent structures is not considered. The respondent also points out that in some building's loadbearing walls may also be compartment walls. The respondent points to condition 2: Table B3: Appendix B which allows a reduction in period of fire resistance for load bearing walls, which are also compartment walls See condition 6(a): Table B3: Appendix B to 60 minutes. The respondent believes that if a compartment wall contains combustible elements, it is probable they will contribute to the fire load and that all this needs review/correcting. Lastly, the respondent points to the 'robustness of the structural fire protection – noting that where fire protection can be damaged or poorly installed additional margins of safety should be provided'.
	146 (3)				☑	The respondent believes for patient safety in single-storey hospitals the REI should be 60 minutes fire resistance not 30 minutes. The respondent believes building occupancy and evacuation strategy need to be considered.

Appendix G Tables of draft options/recommendations for potential future work for each of the hot spots in AD B Volumes 1 and 2

This Appendix presents tables of emerging draft options/recommendations for potential future work (short, medium and longer term) for each of the hot spots in Volume 1 and Volume 2 of Approved Document B.

G1 Hot spots for AD B Volume 1

Hot spot: Introductory text (what is an Approved Document)

Short term consideration	None identified
Medium term consideration	The Manual to the Building Regulations: *A code of practice for use in England* (the manual) and its influence on/over Approved Document B (AD B) ***Could focus on:*** ➢ The 'scope of application' of AD B (notwithstanding the manual's [1] limitations). ➢ The guidance expected to be followed if AD B is out of scope. ➢ What alternative provisions would look like.
Longer term considerations	Guidance for non-combustible (n-c) construction and combustible (c) construction as separate documents ***Could focus on:*** ➢ Whether a re-ordering of the guidance to Volume 1(n-c) and (c) and Volume 2(n-c) and (c) i.e. four separate parts of AD B guidance, would be welcome. ➢ Clear triggers i.e. when to use which part. ➢ Alternative ways of ordering the guidance e.g. B5 moved to front of each Volume/part. ➢ Literature review and research on the effect of building/façade shape are problematic, particularly with combustible constructions (recesses, deep recesses, trenches between architectural detailing, curves and corners etc). ➢ When to require large-scale test evidence. ➢ Whether new provisions are needed?
What is driving the need to consider this?	
Prevalence of combustible construction e.g. Cross Laminated Timber (CLT) The technological position in 2021 is markedly different to that in 2006. The timeline for use of Cross Laminated Timber (CLT) in buildings in the UK shows exponential growth/popularity since 2005 [2]. One CLT supplier in an e-article (a news article for business opportunities for the environmental sector) suggested an anticipated rise in the use of timber in construction of 15% between 2017 and 2025 [3]. The 'ban on combustibles', for use in external wall constructions, under Regulation 7(2) apples to certain purpose group 1 uses (dwellings and institutional uses) but not other use classes. The first 10-storey CLT residential building was built in 2015 (eight years after the 2006 edition of AD B came into effect) see Dalston Works (Wenlock Cross). A modular or CLT building for residential dwelling/institutional use 10 or more storeys tall is still allowed – it is just that Regulation 7(2) will control the external wall build-up and require use of A1 or A2-s1,d0 materials to BS EN 13501-1 *Classification using data from reaction to fire tests* [4]. BRE Global also	

notes that a modular [5] or CLT buildings to which Regulation 7(2) does not apply is still possible today with 10 or more storeys [6].

Introduction of the manual
In July 2020, the manual was published; the first in nearly 20 years. The previous edition was published in 2001(there was no manual to accompany the 2006 edition of AD B).

The manual seems to rule out the use of Approved Documents for certain modern constructions. In the light of the guidance in the manual, it is likely some Authorities Having Jurisdiction (AHJ's) will require compliance be demonstrated using an alternative approach.

In BRE Global's experience, a debate is also needed on alternative approaches. The Intent of paragraphs 0.12 and 0.13 in AD B Volume 1 and 0.18 and 0.19 in AD B Volume 2 is that when using fire safety engineering to BS 7974 *Application of fire safety engineering principles to the design of buildings. Code of practice* [7], both the main standard and the supporting PDs should form the framework for design. In BRE Global's experience, AD B provides the framework, for all but the most unique of buildings e.g. an airport. Scope of application of AD B must be addressed as must be a debate about what is an alternative approach.

One respondent made the following point (quoting AD B first):

'Although approved documents cover common building situations, compliance with the guidance set out in the approved documents does not provide a guarantee of compliance with the requirements of the regulations because the approved documents cannot cater for all circumstances, variations and innovations.'

The respondent went on to say:

The […] Construction Leadership Council['s…] second key policy is to 'Drive innovation and Modern Methods of Construction, through standardisation and aggregation of demand, increased client capability and setting clear requirements of suppliers'. AD B really needs to support this ambition in order to help give greater confidence and assurance to the industry.

Implications if AD B does not change

Overall compliance
If no guidance document exists, it is likely designers, engineers and regulators will arrive at solutions which seem reasonable to *them*. Design and regulation may become a very variable and subjective consideration. The dangers would be a) unwitting non-compliance and b) light-touch regulatory checking when the absolute opposite is needed.

Alternative approaches (Section 0 Volume 1 and Volume 2)
In BRE Global's experience, a fire strategy tends to use the provisions of AD B as a *framework for discussion* and justification of 'equivalence', rather than exclusively using BS 7974 and its supporting published documents.

If no guidance/definition is provided for buildings referred to *the manual* (i.e. unusual occupancy buildings, highly complex buildings, very large or very tall buildings, large timber buildings or building that incorporate modern construction methods) and if AD B is therefore 'closed' to such buildings there will be a problem in demonstrating compliance with the functional requirements of Schedule 1 to the Building Regulations (Part B).

A fire strategy document typically creates a 'case', either that the paragraph(s) of AD B have been complied with or they do not need to be complied with because 'equivalence' to their intent is achieved in some other way. A fire strategy is an account of a justification of a building's design.

In BRE Global's opinion, Fire Strategies would most likely continue to use the closest fitting guide i.e. AD B unless the guidance was explicit that it could not be used.

If the only solution is to adopt Fire Safety Engineering, to BS 7974 the two most obvious challenges are a) the number of practitioners experienced to carry out such a 'full' analysis and b) the number of AHJ's having qualified staff available to check such an analysis.

Hot spot: Management of premises (0.6) Property protection (0.7) and Inclusive design (0.8)

Short term consideration	None identified
Medium term consideration	<u>Management/inclusive design: Guidance in AD B on management's role in the early stages of a fire incident</u> ***Review:*** ➢ The role for building management, responsible for a *'general needs'* residential building, during a fire event; noting that fire safety provisions are now an expectation under Town and Country Planning requirements. ➢ Whether such roles should be noted generally, or specifically under B1 and B5 guidance. ➢ Additional role(s) for management in: a) large and/or tall and/or complex *'general needs'* residential building(s), comprised of combustible construction, if the fire strategy in the building is for simultaneous evacuation and b) other residential, institutional and specialised housing, where the occupants have greater needs than one might consider to be the case for '*general needs.'* housing. ➢ Dignified escape so that all persons have freedom to choose when to evacuate from a building. This review is not in and of itself a review of fire escape strategies and stay-put. This review considers equality and how it is that people without disability can make a decision to leave (using the stair) at any point during a fire event, whilst those with a disability cannot make the same decision unless the building incorporates features such as managed evacuation lifts. ➢ Dignified escape levels up the 'freedom to choose'. If the freedom is exercised the person should be able to make unaided escape. Manual handling devices such as evacuation chairs or an expectation that a person with a disability should be prepared to 'bump-down' the stair (multiple floors) is not acceptable. <u>Property protection and AD B guidance</u> ***Review:*** ➢ Whether industry would be better served if AD B was to be published as separate documents for combustible and non-combustible constructions. How hybrid constructions should be approached. ➢ Whether fire protection test methods and expected periods of fire resistance should be the same for combustible and non-combustible construction. ➢ Industry appetite to determine the *self-contributions* to fire load of walls and floors at the conclusion of standard testing e.g. BS EN 1364 *Fire resistance tests for non-loadbearing elements* [8] and BS EN *1365 Fire resistance tests for loadbearing elements* [9] by considering the rate of cooling as a simple metric.
Longer term considerations	None identified

What is driving the need to consider this?

New fire safety provisions considering inclusion and equality needing to be overseen by building management

Town Planning now requires fire safety provisions to be demonstrated prior to obtaining planning permission. The London Plan *The spatial development strategy of Greater London* [10], a framework 'guidance plan' (issued on behalf of the Mayor of London, by the Greater London Authority) requires London Boroughs to take cognisance of the plan when developing their own local plans. This 'guidance plan' drives an expectation that residential buildings:

Have appropriate alarm systems and suitable means of escape for all building users, irrespective of building height.

To have a fire safety case made which includes *management considerations*, suitably designed stair cores, stairs and firefighting lifts (all written in the plural in the London Plan). Note emergency evacuation lifts are not aspirational they are a requirement for any building which has a lift:

The 'guidance plan' states that buildings should:
"be designed to incorporate safe and dignified emergency evacuation for all building users."

BRE Global notes that two Local Authorities [11] and [12] have reintroduced the concierge service, signalling an intent to manage buildings at all times.

One respondent said they had frequently encountered designs where refuges for disabled people were located in residential cores and at basement or ground level, where the stair continued down to a car park:

"it is often unclear who will maintain and manage the accompanying evacuation strategy. This has the potential for providing a confusing situation where disabled occupants are left to work out their own evacuation plan dependent upon where they are in the building and are not provided with appropriate communication and support."

The former misconception in residential buildings that all persons with mobility issues remain in their flats will not be accepted by Town Planning now.

Property Protection

The Approved Documents provide for life safety not property protection. It has been assumed that the insurance industry will provide guidance on their own requirements for property protection. A new report [13] which provides the insurance Industry's perspective on modern design trends, for larger and mixed use buildings and the risk to the insurance industry associated with 'massive timber buildings', says:

"[there is] a scale of build where occupants become so distant from a place of safety, and remote from attending help, that assurance of life-safety may be problematic where the main structure contains combustible materials."
And
"there is a substantial role for government to play in developing Building Regulations that better appreciate the challenges, if more complex construction types are to be embraced."

The report shows the insurer's thinking, that an Estimated Maximum Loss (EML) for a 'typical' fire in a conventionally built building would amount to a) total loss on the fire floor, b) smoke damage to a number of floors above and c) water damage to a number of floors below. Historic data shows the insurance industry that such EML claims tended to amount to a small percentage of the overall build cost.

Insurers are now faced with the prospect of EML being 100% on combustible structures.
In conclusion, the report states:

"For some (predominantly combustible) construction methods, compliance with building regulations alone might have little relevance to a building's insurability."

The report also goes on to point out the insurer's view of 'traditional methods' of construction and the image this conjured up of '*contiguous*' fire compartments with not many interconnecting voids. The report states:

"In many MMC structures the occupied compartments can be essentially suspended within a lattice of combustible voids whose only defence against fire ingress are layers of plasterboard and the provision of cavity barriers."

In the last three years, several high-profile fires occurred in buildings built of combustible construction where the building was damaged beyond repair or destroyed. In such buildings, the self-contribution of the combustible structure to the fire was evident.

Implications if AD B does not change

AD B remaining current and relevant
It seems that Town and Country planning guidance is moving quickly on providing Fire Safety guidance.

It is important that construction professionals obtain guidance relating to building regulations not just Town Planning on critical life safety installations.

In BRE Global's opinion, AD B needs urgent revision. The Guidance in AD B must be in accordance with or go further than the Town Planning guidance. Planning and Building control guidance should not be left to 'compete'. In BRE Global's opinion, this needs to be addressed and it should align with what Town Planning is now asking for by way of dignified escape for all.

Property protection
There is the probability that there will be further fires where a whole building is so severely damaged that the loss is 100%. In BRE Global's view, there is a societal expectation that loss on this scale is unacceptable. The inference from these observations is that AD B, not considering property protection, is out of step with societal expectation.

It is understood that there is a DLUHC Workstream to consider this topic.

Hot spot: Alternative approaches (0.9)

Covered under: Introductory text (what is an Approved Document)

Short term consideration	Reference to other guidance document(s) ***Consideration may include:*** ➢ If the Centre for Window Cladding Technology (CWCT)/Society of Façade Engineering Fire Committee (SFE) Fire Guidance represents good industry guidance, that could be referenced in any revision of AD B?
Medium term consideration	None identified
Longer term considerations	None identified
What is driving the need to consider this?	
Alternative industry guidance Several respondents believe the CWCT/SFE guide – *Technical Guidance for interpretation in relation to the external walls and specified attachments of relevant buildings in England - Reg 7(2) and Reg 7(3)* (CWCT September 2020) [14] provides practical guidance Several respondents believed the current guidance to be too 'black and white' and inflexible. These respondents believe the CWCT guide does not dilute the intent of Regulation 7(2) and ask that it be included as practical guidance, referenced in AD B.	
Implications if AD B does not change	
Dissatisfaction that AD B is too rigid Note BRE Global brings the observation forward as a survey output. BRE Global has not sought to find a contra view, there may be a view that the current guidance is adequate, and nothing further is required. One Technical Steering Group member believed perhaps there was a need to make it clear that fire engineering could not be used to justify an alternative approach to Regulation 7(2) compliance.	

Hot spot: Purpose groups (0.14)

Short term consideration	None identified
Medium term consideration	Purpose groups ***Review:*** ➢ Whether guidance on HMOs could be re-introduced. ➢ Guidance for specialised housing and how to recognise each subset (particularly sheltered, extra care, close care and very close care forms of housing/tenure). ➢ The effect on overall fire safety when tenant(s) in a block of general needs flats let their flat(s) out as holiday lets e.g. as Airbnb. The effect if over time where a block is more akin to an apart-hotel than a block of flats? What rules are there for B&B accommodation? What is the effect of this 'change of use' on B1, B3 and B5 compliance? ➢ The definition of all of the purpose groups. The definitions in AD B are outdated (also industrial and replenishment centres are new/sub purpose groups, needing review).
Longer term considerations	None identified

What is driving the need to consider this?

HMOs
These are frequently formed in Georgian, Victorian and Edwardian era semi-detached and detached properties in city settings. In BRE Global's experience, it is very common for such a property to undergo material alterations and extensions (ground and first floor and a loft conversion) to extend the floorplate. It is also common for the AHJ to stumble on conversions to HMOs. Resulting buildings (having been extended) often accommodate flats and an HMO, in combination.

Specialised housing
This subject matter is being considered by another DLUHC workstream.

The changes to fire safety provisions where a block of flats becomes a holiday let
What additional standards would apply? In a hotel building, would two stairs be required? In general needs housing it is unlikely there will be management controls? Will the fire detection and alarm provisions and fire strategy be fully understood by all parties?

Revision of definitions for the purpose groups
The definitions have not changed much since the 1985 edition of AD B and respondents believe they need review. Buildings which become apart hotels and Airbnb 'type' accommodation are an emerging trend. Additionally, replenishment centres and or the use of robots are also a modern trend which need consideration.

Implications if AD B does not change

HMOs will continue to be formed
Without guidance, HMOs will be formed but without guidance, the control may be very different.

Purpose groups
The definitions have not changed much since the 1985 edition of AD B and respondents believe they need review to remain relevant.

It is understood that there is a literature review on Purpose Groups (how they are currently defined) in the parallel Triggers Workstream.

Hot spot: Blocks of flats (1.10) Student accommodation (1.11) and Sheltered housing (1.12)

Short term consideration	None identified
Medium term consideration	Fire detection and alarm ***Review:*** ➢ Whether guidance on fire detection and alarm needs changing to reflect a) modern voice-controlled evacuation alert systems b) public/societal expectations and c) whether interlinking of flats to common parts can be done at subtle levels that still result in early intervention and evacuation of those that want to.
Longer term considerations	None identified

What is driving the need to consider this?

Public and societal perception of fire alarms in buildings

Following many fires that have occurred after the Grenfell Tower fire in June 2017 (in tall and/or large and/or combustible residential buildings) media reporting rightly focusses on the fire and whether there has been a failure of one or more aspects of fire safety provision(s). In almost every instance however, there is one common *perceived* 'failure' which relates to the lack of fire alarms sounding during the fire event.

It does seem that there has been a societal shift and now there is an expectation that detectors in corridors are a) linked to each other (and possibly the flats they serve – In BRE Global's opinion, this would need discussion/consideration with wider industry) and b) they should be sounding during a fire event. A common criticism of all such recent fires, in the eyes of residents, is that the fire alarms were not working.

This public perception has wider reach than just asking for a communal alarm (to a version of BS 5839 *Fire detection and alarm systems for buildings* [15], which presently does not exist) or an evacuation alert to BS 8629:2019 *Code of practice for the design, installation, commissioning and maintenance of evacuation alert systems for use by fire and rescue services in buildings containing flats* [16], it also comes back to management's role and what should be happening in a block of flats when fire is first detected.

Implications if AD B does not change

Public perception of fire safety compliance in the built environment

Unchecked, ever more reports will emerge following fires in tall and/or large and/or combustible residential buildings where the fire alarms did not work. Without any public information film(s)/campaigns to counter this, the public/media seem to be creating a popular case for alarms to be interlinked and sound throughout a building during a fire.

Presently, the publicity leads to the current perception that fire detection systems in modern buildings simply do not work, the building Regulations are not fit for purpose and those residents are better served reacting to social media messaging to evacuate.

The counter argument has always been that residents would, over time, ignore communal alarms a) because of malicious alarm setting and b) genuine but false alarms giving rise to evacuation fatigue and blasé attitudes.

Without information film(s)/campaigns either way perhaps change is at stalemate.

Given the use of social media instant messaging, it is probable that a stay put fire strategy will continue to be ignored by ever more residents in blocks of flats. In BRE Global's view, the social media 'apps' method of communication is now established and needs to be worked with not worked against by Building Regulations guidance.

Adverse effect on B5

Firefighting operations are predicated on the stay put policy, if the public now flow down the stair during a fire event the Fire and Rescue Service have new issues to deal with. This also needs review.

Hot spot: Number of escape routes (3.27) Small single stair buildings (3.28) Flats with balcony or deck access (3.29) and Escape routes over flat roofs (3.30)

Short term consideration	None identified
Medium term consideration	Guidance on smoke management in extended residential corridors ***Consideration to be given to:*** ➢ AD B providing guidance for smoke management in single stair buildings with extended corridors that endorses/follows the SCA *Guidance on CFD Analysis for Smoke Control Design in Buildings* [17] and the SCA Guidance on *CFD Analysis for Smoke Control Design in Buildings* [18] or the emerging guidance coming from the Draft BS 9991-1:2021 *Fire safety in the design, management and use of residential buildings. Code of practice* [19] or other guidance. ➢ The intent of smoke extract systems (natural and mechanical) and smoke control systems (pressure differential systems) should undergo a fundamental review in terms of protecting the corridor or stair, or both, etc. and how that is achieved.
Longer term considerations	None identified

What is driving the need to consider this?

The need for guidance on smoke management in extended corridors of single stair buildings.
It is common for residential buildings to have travel distances in dead end corridors of up to 30m. There is no additional guidance in AD B for such situations and it is felt there should be guidance.

It seems that the Smoke Control Association guides and/or the Draft BS 9991:2021 are the main current guidance documents to consider. The question is whether AD B can either: a) reference one or more of these guides or b) to adopt (lift the guidance directly into AD B).

The Fire and Rescue Service said they had received an application for a building with a natural smoke ventilation shaft in a 40-storey tower and asked would it work?

Implications if AD B does not change

As the situation is so common it is believed that AD B should be giving guidance.

The intent of smoke extract systems (natural and mechanical) and smoke control systems (pressure differential systems) is that they should undergo a fundamental review in terms of whether protection to the corridor or stair, or both, is achieved in practice.

Hot spot: Smoke control in common escape routes (Natural and mechanical ventilation) (3.49 to 3.54) inclusive

Short term consideration	None identified
Medium term consideration	Guidance on smoke management in extended residential corridors ***Consideration to be given to:*** ➢ AD B providing guidance for smoke management in single stair buildings with extended corridors that endorses/follows the SCA guide (*Smoke control to common escape routes*) and the SCA Guidance on *CFD Analysis for smoke Control Design in Buildings* or the emerging guidance coming from the Draft BS 9991-1:2021 or other guidance. ➢ Review of construction and testing of AOVs (to BS EN 12101-8: 2011 *Smoke and heat control systems - Smoke control dampers* [20])
Longer term considerations	None identified

What is driving the need to consider this?

Background information on the design of smoke ventilation in corridors

See Hot spot: *Number of escape routes (3.27)* to *Escape routes over flat roofs (3.30)* and the consideration that could be given to providing guidance for smoke management in single stair buildings with extended corridors that endorses/ follows the SCA guide (*Smoke control to common escape routes)* and the SCA Guidance (*CFD Analysis for smoke Control Design in Buildings)* or considers and endorses guidance being considered in the Draft BS 9991-1:2021 *Smoke and heat control systems - Smoke control dampers* or considers and endorses new and different guidance.

A key consideration for extended corridors and tall single stair residential buildings, not currently covered in AD B, includes tenability criteria in the corridor and whether the tenability criteria should apply at all stages of a fire incident or just the firefighting phase?

BRE Global notes the intention behind new Town Planning considerations (when considering plans for a new building) giving *all* persons equal footing to make unaided escape, *at any stage (*See *above Hot spot: Management of premises (0.6) Property protection (0.7) and Inclusive design (0.8)).* Accordingly, Town Planning consideration now 'potentially' broadens the escape phase in the corridor serving the flat of fire origin to accommodate all other residents (not just those from the flat of fire origin) who may choose to evacuate their flats.

The wording of the Schedule 1 relevant requirement B1 Means of warning and escape is:

"[…] and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used ***at all material times****"*

BRE Global's emphasis in bold but these words would tend to suggest that corridors and lobbies should be tenable at all material times not just during the initial escape phase for the occupants of the flat of fire origin.

One respondent raised Section 6 and Section 7 of the Building Act 1984 [21], which considers the approval process for Approved Documents (AD) and their status respectively. The respondent observed that a designer could say they followed AD B irrespective of the extent of guidance contained. Section 7 does not consider the depth, breadth and extent of guidance as being the key determinant – the wording in Section 7 simply focusses on the expression '*comply****[ing]*** *with an*

Approved Document'. It seems an argument some designers use is *"it does not say I can't do it in the Approved Document".* Whether the guidance is very comprehensive or very limited, some designers may argue they can only follow the guidance provided. Section 7(b) of the Building Act 1984 states: *"[…]Proof of compliance with such a document may be relied on as tending to negative liability."* Other respondents pointed to what they believe to be an error in the guidance on smoke management in corridors. The respondents believe that Automatic Opening Vents (AOVs) which open from all floors into a vertical riser shaft (whether the shaft is a natural or powered extract shaft) should be fully tested to BS EN 12101-8 and they should not be a timber FD 30s door with standard overhead door closers.
Implications if AD B does not change
As the situation is so common it is believed that AD B should be giving guidance. The intent of smoke extract systems (natural and mechanical) and smoke control systems (pressure differential systems) is that they should undergo a fundamental review in terms of whether protection to the corridor or stair, or both, is achieved in practice. Will AD B provide guidance that corridors should be tenable for escape at all times? In BRE Global's view it is likely Generic Risk Assessment GRA 3.2 Fighting fires in high rise buildings [22] will be reviewed and matters of evacuation, containment, intervention and rescue will all rely on smoke management, whether that is smoke extract of pressurisation of stairs lobbies and lifts. The subject needs review.

Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24)

Short term consideration	None identified
Medium term consideration	<u>Diagrams 8.1 and 9.1 of Volumes 1 and 2 and paragraph 5.21 and 9.14 of Volumes 1 and 2 respectively,</u> ***Review and further consideration of:*** ➢ Diagrams 8.1 and 9.1. Respondents are saying these diagrams are no longer realistic/relevant in 2022. Perhaps industry can lead on production of guidance for AD B to 'endorse' and adopt. ➢ The effect of leaving cavity barrier guidance in these Diagrams loose (just indicative of 'principles') on the quality/variability of the built environment. The effect of working without firm guidance and the probability of lowering the compliance 'bar'. ➢ How effective cavity barriers will be in preventing unseen spread of fire and smoke in cavities in 'congested zones' just below floor slab level, on the line of a compartment wall. ➢ AD B's acceptance of variability in fire resistance standards (i.e. the approach cited in Volume 1 paragraph 5.21 and Volume 2 paragraph 9.14). Both paragraphs suggest 30:15 need only be aspirational and that a lesser provision will still be acceptable. The wording is: ➢ *"[…] not necessarily achieve the performance specified [**i.e. 30:15**]*."

Longer term considerations	None identified

What is driving the need to consider this?

Façade complexity and the façade industry

Building envelopes are more complex now than they were in 2006. In BRE Global's opinion, Architects are much more adventurous with the shape and number of materials that comprise a façade [23] facades lean forward, twist, recess, incorporate 'fins' and curve, all of which lead to complex interfaces. The differences in requirements for cavity barriers and a fire stopping is still debated – there is uncertainty.

The Centre for Window and Cladding Technology was only sixteen years old when the consultation documents for changing AD B (Volumes 1 and 2) were published in July 2005 [24]. The very first Journal (a biannual journal thereafter) of Façade Design and Engineering was published in 2013 [25]. The Society of Façade Engineers was one year old when the consultation documents for changing AD B (Volumes 1 and 2) were published in July 2005 [26].

The industry is more mature and complex now than it was at the time of the last major revision of AD B.

Cavity barriers guidance

As facades become ever more complex, the criticism from industry is that the guidance on the provision of cavity barriers and fire stopping has remained the same in AD B since the introduction of Diagram 33 in the 2006 edition of AD B. The suggestion is that facades in 2022 have become more varied and interfaces (between façade materials themselves and the building frame) more complex leaving Diagram 8.1 in AD B Volume 1 and Diagram 9.1 in AD B Volume 2 of little relevance to the practitioner.

A selection of criticisms includes:

- There is no full-scale system test methodology.
- Testing should be devised so that built-up systems can be tested.
- Small-scale testing is not 'realistic' and therefore not a true reflection of performance at scale.
- The regime of cavity barrier testing is out of step and has been so for many years – how they may perform over time (with building movement, weathering and ageing) is unproven.
- The practicality of installation and inspection of cavity barriers in mullions and transoms which cross compartment floors and walls.
- The practicality of installation and inspection of cavity barriers in extrusion voids and behind/under gaskets and cleats.
- Open state cavity barriers allow smoke to pass before the barrier closes.
- Schedule 1 relevant requirement B3(4) is:
  "The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited."
  Open state cavity barriers will contravene this requirement (as might fire dampers in various settings) but if the smoke is not too extensive/hot, there seems to be acceptance that this is an acceptable contravention of the requirement? What constitutes not too extensive/hot and what is an acceptable threshold is not clear?
- In some purpose groups (residential uses particularly) bathrooms and kitchens will be located back to back and be stacked. This leads to congested zones in external walls as extract ducts/pipes terminate/enter in one tight location on the façade. Add to this congestion the bracketry for both the façade and balconies and it is clear that cavity barriers in these locations will usually not be effective. Congested zones have emerged as an issue needing to be considered a) how to avoid them b) what systems can accommodate them.
- The additive principle is now used by designers but there is no guidance on whether it is acceptable or not. An example of this is where a full height window may have a head and a cill

at concrete floor slab level. Why not omit the cavity barriers locally and adopt one at 90 minutes at floor slab level? Without guidance there is variability in how this is approached. ➢ In BRE Global's opinion, open state cavity barriers are problematic for dropping fires (i.e. fires they were not intended to control) particularly in timber-built cavity wall structures. In BRE Global's experience, burning brands associated with falling cavity fires come to rest on a barrier on either one or two floors below the point of fire breakout. Having landed on the barrier developing fires cause the membrane and sheathing board to combust from barrier upwards. Research is needed on dropping fires.
Implications if AD B does not change
AD B will become further and further out of date and irrelevant if unchanged. AD B is seen to be encouraging a reduction in standards for cavity barriers that tells the reader that nearly enough is good enough.

Hot spot: Sprinklers (7.4)

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	<u>Water mist systems</u> ***Considerations may include:*** ➢ Parameters for use of water mist systems – understand and define its limitations. ➢ The effect of light breezes on the efficacy of water mist systems. Does this narrow the scope of use? ➢ Can water mist systems be used as a compensation measure for a reduction in a structural fire resistance provision, as might be the case with a sprinkler installation to BS EN 12845: 2015 *Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance* [26] or BS 9251: 2014 *Fire sprinkler systems for domestic and residential occupancies. Code of practice* [2014] [27]? <u>Sprinklers</u> ***Considerations may include:*** ➢ Sprinklers in car parks with new electric charging infrastructure, to new Part S of Schedule 1 to the Building Regulations 2010 (as amended). Sprinklers need to be viewed in conjunction with other considerations like electric shut-off control switches in car parks. ➢ Whether BS EN 12845 2015 designed sprinkler installations are suitable in automated customer fulfilment centres for online grocery retailing in both large hub fulfilment centres micro customer fulfilment centres. How effective conventional sprinklers are in partially shielded spaces. Would fit outs to form micro customer fulfilment centres always trigger consideration under regulation 3(2) and 3(3) of the Building Regulations 2010 (as amended) for material alteration(s) so that suppression could be installed. ➢ Other fulfilment centres serving other sectors.

What is driving the need to consider this?
<u>High pressure water mist suppression systems</u> Should water mist guidance be included in AD B? Is the water mist industry producing systems that are capable of being tested to BS 8458:2015 [28]? Should AD B consider accepting water mist systems in lieu of sprinkler systems for use in domestic situations as alternative to BS 9251? Should other systems to BS 8458 to Parts 4, to 7 inclusive (for various uses in the industrial and commercial sector) be considered separately or at the same time? Can water mist be used as a trade-off compensatory feature (e.g. a reduction in fire resistance) or is it a pure suppression system and not a trade-off. <u>Personal protection systems to LPS 1655 *Requirements and test methods for the LPCB approval and listing of personal protection watermist systems*</u> Should AD B reference similar personal protection systems to LPS 1655 [29] (in AD B)? If, for example during a garage conversion application, it became apparent that the mobility status of a resident, taking up occupation of the garage conversion, was significantly impaired? This is particularly relevant if evacuation would require the Fire and Rescue Service to carry the individual from the dwelling. <u>Sprinklers in car parks</u> In addition to any requirement to change the guidance regarding sprinklers in car parks, there needs to be consideration of mains cut out switch rooms so that water is not sprayed around where electrics are left live. Modern basements we need to start to look at. <u>Are corridors sterile spaces anymore</u> What about mobility scooters and fan coil air conditioning in common corridors? <u>Customer fulfilment centres</u> Automated customer fulfilment centres for online grocery retailing can be vast purpose built (hub) centres or small (micro fulfilment centres). Hub fulfilment centres are like a giant ever moving Rubik's cube, with groceries stacked in moving tote boxes within the cube. Robots move across the top of a lightweight grid located above the cube (moving stacks of grocery tote boxes about the grid beneath) also located on the grid are on-grid robotic pick-arms. The micro fulfilment centres operate on a similar principle, but everything is smaller scale. The micro fulfilment centres are not located in large purpose built industrial/storage buildings. Micro fulfilment centres are now designed to be grid fit-outs in existing buildings. The intention with micro fulfilment centres is that they are located in smaller buildings, or they occupy a small footprint in a larger mixed-use building. It is not clear what purpose group fulfilment centres belong to.
Implications if AD B does not change
AD B will become further out of date as modern building designs and uses emerge.

Hot spot: Cavities – flats (8.1) Provision of cavity barriers (8.2) and Pathways around fire-separating elements (8.3)

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	<u>Approved Document and approved installer scheme</u> ***Consideration could be given to:***

	➢ How effective cavity barriers will be in preventing unseen spread of fire and smoke in cavities in 'congested zones' just below floor slab level, on the line of a compartment wall. ➢ The production of an Approved Document for cavity barriers. ➢ Approved installer schemes for cavity barrier installations.
What is driving the need to consider this?	
See section 5.18 to 5.24 above which cover the main considerations that repeat here Congested zones Congested zones in facades need particular consideration. In some purpose groups (residential uses particularly) bathrooms and kitchens will be located back to back and be stacked. This leads to congested zones in external walls as extract ducts/pipes terminate/enter in one tight location on the façade. Add to this congestion the bracketry for both the façade and balconies and it is clear that cavity barriers in these locations will usually not be effective. Congested zones have emerged as an issue needing to be considered a) how to avoid them b) what systems can accommodate them. Approved Document Could an Approved Document for cavity barriers be produced by industry approved by government e.g. like the Approved Document: Basements for dwellings guide (1997) [30] and Approved Document: Timber intermediate floors for dwellings (excluding compartment floors) [31]? Approved installer scheme Could industry provide a reliable approved installer scheme?	
Implications if AD B does not change	
AD B will become further and further out of date and irrelevant if unchanged.	

Hot spot: B4 Intention and Introduction (10.1)

Short term consideration	Educative 'meanwhile' guidance A holding statement (at the end of the Intention section of B4) could draw the reader's attention to modern but uncontrolled (outside the scope of B4(1) and B4(2)) materials and just inform the reader that wood-effect, plastic composite fencing, and similar material sold for decking when used in combination particularly on narrow plots or roof/terraces presents a risk to occupants of the building. Additionally, the informative could state: Whilst not a building regulations consideration under B4(1) or (2) (per se) and pending further research, if use of these materials cannot be avoided, consideration could be given to low rise 1.0m or less fencing and small areas of decking (sited as remote from the wall(s) of the building as it is possible to achieve).
Medium term consideration	None identified
Longer term considerations	Wood effect plastic composite ***Considerations may include:*** ➢ Conducting experiments to characterise the reaction to fire properties of different versions of the material. Downward fire spread

	Considerations may include: ➢ Conducting research and or experiments into downward fire spread and consider guidance in AD B as to how to prevent it occurring. <u>Unusual fire spread</u> ***Considerations may include:*** ➢ Conducting research and or experiments into the reaction to fire properties of manmade tiles and slates and whether the material tends to flow and spread fire at high heat fluxes, i.e., at intensities greater than those experienced during standard fire testing. <u>Fire testing</u> ***Considerations may include:*** ➢ Determining if additional testing is needed and if the standard testing needs amending to consider the vertical flaming associated with modern roofing materials and modern roof build-ups.

What is driving the need to consider this?

<u>Intention</u>
Three broad intents of B4 under the heading *Resisting fire spread from one building to another* are:

- resisting ignition by an external ignition source to the outside surface of a building
- managing unprotected areas to prevent a building on fire igniting another building
- restricting flame spread over roofs and fire penetration from external source(s).

The first two considerations below (relate to composite fencing material and downward fire spread). They are offered as 'outside of the box' thinking. The risk to occupants is real enough, as described, but the Schedule 1 relevant requirements do not accommodate either risk at present.

A third consideration below is raised by BRE Global following observations of a material's performance during a fire at low-rise block of flats and falls under broad theme c). The fourth consideration relates to a risk that becomes evident during fire testing and is not believed to be covered yet (like a) and b) and relates to c).

<u>Composite wood effect plastic</u>
Two separate fires involving wood-effect, plastic composite fencing in Lancashire (May 2020 [32] and April 2021) [33] revealed they were very intense, rapidly spreading fires that spread into several terraced properties. On each occasion the optical density of the smoke produced hampered firefighting access to the fire.

Such wood-effect, plastic composite fencing was not seen in use in 2006. It is marketed as being more durable than timber with long life expectancy, hence its use. Timber fencing is not a building regulations consideration however, having seen footage of the fires and aftermath, BRE Global concludes there is a need to highlight the intensity and rapidity of fire spread and the optical density of the smoke produced.

<u>Downward fire spread</u>
One respondent identified downward fire spread as a phenomenon needing to be better understood and for AD B to provide guidance to mitigate it. BRE Global's observation of downward fire spread has involved external cavity walls and timber floors, of timber framed buildings. BRE Global has observed a fire spread mechanism when burning brands fall down the cavity of an external wall, coming to rest on a barrier one or more floors below – the fire can develop and grow upwards again. The mechanism of downward fire spread by floors occurs particularly when a roof collapses (even partially) onto the top storey of a building during a fire. With the seat of the fire partially shielded by the collapsed roof, a fire

can burn through the floor from the top surface. In long duration fires the building can 'pancake' in on itself as one floor drops onto the floor below which burns through and drops to floors below successively. Compartment floors have fire resistance from the underside only. Unusual fire spread One fire that BRE Global observed involved particularly rapid fire spread via the roof construction. The building was a low rise structure over three floors. A fire spread to the roof and via the roofing tiles, the fire spread across three compartment lines in less than 30 minutes. The roof tiles appeared to be man-made slates which use a resin binder to 'bind the slate'. The fire seemed to be able to drip and flow. Fire testing BRE Global (Fire investigation) is aware that during some standard fire tests on roofing build-ups there was unusually intense flaming from the surface of the test sample. Whilst a roof build-up may pass a test with no penetration through the build-up during the allotted period, it is of increasing concern that the top surface(s) of modern roof build-ups can flame intensely. The flaming can be in the region of 1.5m to 2.0m above the test panel and pose a threat to the laboratory equipment. If a roof covering has the potential to flame intensely yet pass a test and if decking and low level fencing is not controlled (and plastic composite material could be selected) then it is reasonably foreseeable that a significant fire could occur on a flat roof of a building and fire could spread to accommodation above via open windows or glass breakage.
Implications if AD B does not change
AD B will become further and further out of date and irrelevant if unchanged.

Hot spot: External surfaces (10.5) Materials and products (10.6 & 10.7) and Cavities and cavity barriers (10.8)

Short term consideration	Clarification ***Consideration could be given to:*** The wording in Table 10.1, emphasising that 'no provision' does not mean no requirement.
Medium term consideration	None identified
Longer term considerations	None identified
What is driving the need to consider this?	
Surprise at 'no provisions' entry in table 10.1 It was felt that there should be a statement requiring some provision rather than the retention of the no provision requirement legacy from Diagram 40. This is not a new requirement but the retention of earlier standards.	
Implications if AD B does not change	
Designers may use no provision as no requirement, and this is clearly not what AD B was wanting to achieve. The opportunity to close loopholes is lost.	

Hot spot: Materials (10.12) Materials change of use (10.13) and Additional considerations (10.14 & 10.15)

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	None identified
What is driving the need to consider this?	
Ban on Combustibles review Many of the points raised in this Hot spot related to how the new Regulation 7(2) is bedding in. There is currently a review of the combustibles ban which these comments can feed into. One observation from a Technical Steering Group member was that the questions currently being raised seek for AD B to provide *all* the answers. The Technical Steering Group member suggested design engineers (fire engineers, familiar with materials testing) should create a case as to why the material can be accepted in a particular case for the AHJ to make a judgement on.	
Implications if AD B does not change	
Given the review it is too early to say if there are implications. Await the ban on combustibles review.	

Hot spot: B5

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	All of B5 requiring review ***Considerations to include:*** ➢ Current provisions ➢ Emerging provisions/matters which may come to light during a detailed review of B5
What is driving the need to consider this?	
Access and facilities for Fire and Rescue Service Many of the points raised in Volume 1 related to access requirements. There are so many matters that could be reviewed, and the Fire and Rescue Service concur that there should be a complete review of B5 provisions, a workstream in its own right.	
Implications if AD B does not change	
There is a workstream planned for B5 review. It is too early to say what the implications for AD B would be if the recommendations from that workstream are overlooked.	

Hot spot: Regulation 38

Short term consideration	None identified
Medium term consideration	Review guidance given in AD B on how to comply with Regulation 38 ***Considerations to include:*** ➢ One Technical Steering Group member commenting on this Hot spot observed that AD B could provide more guidance on what is expected by way of the 'detail' to be provided for complex life safety systems (including expectations for maintenance and testing of these systems). ➢ How the provision of better information would be of benefit to fire safety risk assessors to help them readily understand how systems installed in buildings were conceived and intended to be maintained. ➢ How the provision of better information would be of benefit to the Responsible Person (Duty Holder) under Regulatory Reform (Fire Safety) Order (the order) [34] to help them better understand their responsibilities in planning and maintaining and keeping records of the maintenance and testing of such systems. ➢ How this would help the Responsible Person (Duty Holder) make more informed decisions as to where to place maintenance and testing and record keeping contracts i.e. to give full consideration to the retention of the original designer/installer with full knowledge of the system for the maintenance contract.
Longer term considerations	None identified

What is driving the need to consider this?

How it is being enforced

It was the enforcement of Regulation 38 that came into focus in the survey responses.
The broad concern identified was that Regulation 38 compliance is not being rigorously being 'enforced'. This is because Regulation 38 describes what a builder must do at completion or occupation. The Regulation directs the builder to provide:

"[…] *information to the responsible person* […]".

The AHJ is not directly required/expected to determine the adequacy of such '*information*'. If they were, it would require additional resource. Also, if such checks were mandated, there may be an additional burden on the Fire and Rescue Service; assuming this would be the '*check of last resort'* and that the AHJ would be consulting one last time with the FRS for their approval of the information.

In BRE Global's opinion, if there was such a *'check of last resort'*, it runs the risk of normalising last minute plans approval, as a fait accompli. Frequently, plans get approved after a building is built and it may just 'normalise' 11th hour approvals.

In BRE Global's view, some builders may believe that in providing the O&M manuals for practical completion, they discharge their duty under Regulation 38 too.

One Technical Steering Group member suggested that the guidance in AD B on Regulation 38 could provide more content on what is expected by way of detail that needs to be provided for complex life safety systems.

The point being made was: a) O&M literature/manuals alone are not sufficient to comprise a meaningful Regulation 38 submission and b) better detail would help the persons undertaking fire safety risk assessments and the responsible person place maintenance contracts.
Implications if AD B does not change
If there is no change the opportunity to explain the role of the AHJ in the process is lost. If there is no change the opportunity to explain that compliance with the obligation to issue O&M manuals does *not* address what Regulation 38 seeks to address.

Hot spot: Appendix B

Short term consideration	None identified
Medium term consideration	<u>Review the 'teaching' guidance, removed from 2019 edition of AD B</u> ***Considerations to include:*** ➢ If the omissions and new words result in the new AD B being intelligible to the wide range of people and bodies engaged in construction, maintenance and refurbishment of buildings, and not just to professionals who may already have a depth of knowledge of building regulations and building control matters. ➢ If the material edited out in the 2019 edition disadvantages non-construction professionals or benefits them. ➢ If the material edited out of the 2019 edition removes useful guidance for those engaged in maintenance or refurbishment of older housing stock. ➢ If there is any doubt about how accessible the document is that this feeds back to the suggestion made under the longer term consideration(s) of the Hot spot above '*Introductory text (what is an Approved Document)'.*
Longer term considerations	None identified
What is driving the need to consider this?	
<u>Removal of 'teaching' elements in AD B</u> BRE Global understands that in revising AD B generally and revising appendices, some of the '*teaching*' paragraphs were removed. In BRE Global's view this may make sense for those construction professionals that do not need to see the background information, but it does appear to run counter to the coroner's Rule 43 letter of 28th March 2013 (to The Rt Hon Eric Pickles MP) following the Lakanal House inquiry. Three broad recommendations were made (only two bullet points repeated below for brevity). The letter stated: *"[…] The introduction to AD B states that it is " … intended to provide guidance for some of the more common building situations". However, AD B is a most difficult document to use. Further, it is necessary to refer to additional documents in order to find an answer to relatively straightforward questions concerning fire protection properties of materials to be incorporated into the fabric of a building."* "[…] It is recommended that […] AD B[…]: *is expressed in words and adopts a format which are intelligible to the wide range of people and bodies engaged in construction, maintenance and refurbishment of buildings, and not*	

just to professionals who may already have a depth of knowledge of building regulations and building control matters.
Provides guidance which is of assistance to those involved in maintenance or refurbishment of older housing stock, and not only those engaged in design and construction of new buildings[…]"

Performance of materials, products and structures
There were many points made during the survey which warranted a marker also being placed against one or more appendices. Appendix B had the greatest number of hits.
An example of this was where the comment related to the complexity of interpreting fire test information and what information a manufacturer should/must provide. This is not a modern construction technology, design or building use matter per-se but it might link into the point made above.

Many respondents were disappointed to lose the tables e.g. Table A5: Notional designations of roof coverings, Table A6: Use and definitions of non-combustible materials and others. This is not a modern construction technology, design or building use matter per-se but it might link into the point made above.

Some respondents asked for clearer definitions and diagrams in the appendices. This is not a modern construction technology, design or building use matter per-se but it might link into the point made above.

Implications if AD B does not change

The guidance may be out of step with user expectations.

G2 Hot spots for AD B Volume 2

Hot spot: Alternative approaches (0.9)

Covered under: Volume 1 Introductory text (what is an Approved Document)

Short term consideration	None identified
Medium term consideration	As Volume 1 Hot spot: Introductory text (what is an Approved Document)
Longer term considerations	As Volume 1 Hot spot: Introductory text (what is an Approved Document)

What is driving the need to consider this?

Combustible construction
The main theme emerging was that combustible construction is not behaving as steel and concrete buildings are. This brings us back to the same considerations identified under Volume 1 Hot spot: Introductory text (what is an Approved Document).

Timber buildings and fires during construction
Whilst not controlled under the building regulations the point was made that significant fires have occurred whilst buildings are undergoing construction. Such timber framed buildings 'threaten' adjacent buildings until the façade skin is built (e.g. brickwork). The environmental damage caused by such large fires are significant (See the Colindale fire July 2006 [35]).
Should buildings under construction be included in AD B guidance?

Cross Laminated Timber (CLT)
We still need to research CLT as it is not fully understood.

Driving the change
Sustainability as well as Part L is driving the need for ever more timber in construction.

Implications if AD B does not change

As Volume 1 Hot spot: Introductory text (what is an Approved Document)

Hot spot: Single escape routes and exits (2.7) Access control measures (2.8) Number of occupants and exits (2.9) Alternative escape routes (2.10) Inner rooms (2.11) Planning of exits in a central core (2.12) and Open spatial planning (2.13)

Short term consideration	None identified
Medium term consideration	As Volume 1 Hot spot: Appendix B
Longer term considerations	None identified
What is driving the need to consider this?	
General comments The comments were too broad ranging to pick up on any single theme. People do not understand the guidance on dead end interpretation. It has always been thus, and it could be clearer in AD B. See also Volume 1 Hot spot: Appendix B	
Implications if AD B does not change	
General comments Nothing new identified, only a general comment about diagrams being clearer, text being clearer. See also Volume 1 Hot spot: Appendix B	

Hot spot: General provisions (2.34) Planning for progressive horizontal evacuation (2.35 to 2.40) Fire detection and alarm (2.41) Bedrooms (2.42 & 2.43) Ancillary accommodation (2.44) Door closing devices (2.45) and Sprinkler systems (2.46)

Short term consideration	None identified
Medium term consideration	Wider consideration of the specialised housing workstream ***Considerations to include:*** ➢ The full range of provisions necessary for the different specialised housing forms of tenure: a) Sheltered housing b) Extra care c) Close care d) Very close care e) Care homes f) Nursing homes g) Hospices. Purpose groups ***Review*:** As Volume 1 Hot spot: Purpose groups (0.14)
Longer term considerations	None identified

What is driving the need to consider this?
Residential care homes and specialised housing Is combustible construction an appropriate form of construction for residential care homes (and other forms of specialised housing like Extra care or Close care or Very close care)? If the people in the building have mobility issues, should the policy be stay-put or simultaneous evacuation and if not simultaneous evacuation, is progressive horizontal evacuation appropriate? Societal shift to retirement villages (for Sheltered housing, Extra care etc.) The ageing population means the specialised housing sector is booming. A Building article [36] suggests that by 2030, a further 2 million people will have entered retirement age, rising to 16 million people by 2040, equating to a quarter of the total UK population at its current level. There is a societal shift that sees very large complexes as an attractive option (for some) for post-retirement living. They must be treated differently to general needs housing. Care homes One respondent identified a scheme where the upper tier of a care home was akin to a hospital (for infirm residents), those requiring most care. In this particular instance, the lower floors were given to people who were more mobile. This again brings into question the form of construction and if combustible construction is suitable, what additional provisions e.g. suppression, compartmentation, refuges and fire escape strategy is appropriate? Also, in combustible construction, how appropriate is it for progressive horizontal evacuation for people with limited mobility if staff numbers at night are reduced? Homes formed by change of use Care homes can be formed in buildings that do not lend themselves to progressive horizontal evacuation. Revision of definitions for the purpose groups As Volume 1 Hot spot Purpose groups (0.14)
Implications if AD B does not change
Guidance on specialised housing In 2006, the following would have been understood to comprise the specialised housing sector: a) Sheltered housing, b) Care homes, c) Nursing homes and d) Hospices In 2021, the following comprises the specialised housing sector: a) Sheltered housing b) Extra care c) Close care d) Very close care e) Care homes f) Nursing homes g) Hospices. Guidance is needed on the definitions for each, as well as provisions for each. Purpose groups The definitions have not changed much since the 1985 edition of AD B and respondents believe they need review to remain relevant.

Hot spot: External escape stairs (3.32 & 3.33) Access lobbies and corridors (3.34 & 3.35) Exits from protected stairways (3.36) Separation of adjoining protected stairways (3.37) Use of space within protected stairways (3.38) Stairways (3.39) and Basement stairs (3.40 & 3.41)

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	None identified
What is driving the need to consider this?	
External escape stairs and exits from protected stairs and riser shafts The comments were too broad ranging to pick up on any single theme as being problematic. One comment related to unprotected areas in a large building threatening a glazed protected stair in an adjacent building. One theme related to the guidance on the protected passageway from stair to final exit and that this is not well appreciated. The suggestion was for better diagrammatic guidance. Riser shafts seem to be problematic. Modern practice is to take the service riser from basement up through the exit passageway at ground floor level thereafter the riser usually appears in the corridors leading to accommodation. The request was for such riser shafts to be allowed in the exit passageway.	
Implications if AD B does not change	
Guidance seen to be lacking by some users of AD B.	

Hot spot: Intention B3 Fire resistance standard (7.1 & 7.2) and Exclusions from elements of structure (7.3)

Short term consideration	None identified
Medium term consideration	Testing at scale (being considered under other Part B: review, workstreams) ***Considerations to include:*** ➢ 'Benchmarking' different systems against each other by using the full-scale testing. ➢ 'Benchmarking' how modules perform post fire test i.e. which systems/technologies 'retain and sustain combustion' after the gas is turned off and which systems self-extinguish and cool as one would expect from non-combustible construction.
Longer term considerations	None identified

What is driving the need to consider this?
Is it possible to define 'acceptable internal fire spread'? One respondent asked if this could be quantified. Combustible timber frame, CLT and modular construction How can a building be considered stable to: *"[…]withstand the effects of fire without loss of stability"* if the structure itself is on fire (assuming plasterboard protection 'fails' before or during the fire). When considering other residential uses e.g. student accommodation (these may sometimes be designed along the lines of '*general needs flats'* with an agreed stay-put strategy). When considering hotels, there is usually a period of seek and search, during which time guests are not alerted to a fire for the time it takes hotel staff to conduct seek and search operations; after which the call to the Fire and Rescue Service will be confirmed or cancelled. In both situations, the suggestion is that persons should not be put at risk by remaining in a building which is inherently combustible. This may be being mirrored by the public's 'view' of fires, although this may, to some extent, be a media construct. In BRE Global's opinion, an emerging public *'view'* feels real enough, and BRE Global senses a real concern that several (whether perceived or actual) near-miss fires, have occurred where building occupants have managed to escape from a fire, just in time. It may also be a modern public view that large buildings should not be being disproportionately damaged by what should be a reasonably foreseeable event (i.e. a fire) in a building. True behaviour in fire There needs to be further investigation into the fire resisting properties of CLT during a fire in very large buildings, particularly if the timber is on show (without board protection). More research is needed and testing of prototypes and systems needs to be at scale. Panelised and modular systems One view was that when such systems are built in the factory, the quality control is understandably very good, and components may achieve perfect fit on the assembly line. The point to consider is what happens when the system comes to site i.e. if there is an imperfection in fit/levelling in the building. This may result in small, interconnected voids which cannot be 'got at' after modules are installed. Another consideration is that walls of modules may have voids in them and if linings are timber clad there is a problem to resolve. Panelised building types There should be a requirement for large-scale testing of actual systems for every building system: benchmarking is key.
Implications if AD B does not change
Guidance is needed to stay relevant.

Hot spot: Sprinklers (8.14)

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	Water mist As Volume 1 Hot spot: Sprinklers (7.14)
What is driving the need to consider this?	
As Volume 1 Hot spot: Sprinklers (7.14) The respondents ask that AD B does not allow trade-offs i.e. respondents ask that fire suppression installations should be mandatory. How well will water mist perform?	
Implications if AD B does not change	
AD B will become further out of date as modern building designs and uses emerge.	

Hot spot: Junction of compartment wall or compartment floor with other walls (8.22 to 8.24) and Junction of compartment wall with roof (8.25 to 8.29)

Short term consideration	None identified
Medium term consideration	Diagrams 8.1 and 9.1 of Volumes 1 and 2 and paragraph 5.21 and 9.14 of Volumes 1 and 2 respectively. ***Review and further consideration:*** ➢ As Volume 1 Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24) Spandrels ***Review and further consideration of:*** ➢ Whether spandrels should be mandated in certain designs and if mandated, what should the fire performance requirements be?
Longer term considerations	None identified
What is driving the need to consider this?	
Detailing the fire stopping between combustible internal wall and an external wall (and how should this be tested?) See Volume 1 suggestion that Diagrams 8.1 and 9.1 of Volumes 1 and 2 and paragraph 5.21 and 9.14 of Volumes 1 and 2 respectively, need review. Curtain walling and fire rated spandrels One view is that in Europe, spandrel panels are controlled i.e. they do require fire resistance. England is apparently out of step in not requiring these to be fire rated. BRE Global has not researched how	

widespread this is in Europe and if there is a standard, even where the building can have 100% unprotected areas (on account of space separation). Restraining a façade back to the structure to reduce the movement away from the slab edge As Volume 1 Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24). Flat roofs meeting compartment walls There is currently some research (at small scale) on this point. This should inform DLUHC as to whether there is merit in larger scale, more detailed work.
Implications if AD B does not change
Guidance will be seen to be lacking by some.

Hot spot: Cavities (9.1) Provision of cavity barriers (9.2) and Pathways around fire separating elements (9.3)

Short term consideration	None identified
Medium term consideration	Diagrams 8.1 and 9.1 of Volumes 1 and 2 and paragraph 5.21 and 9.14 of Volumes 1 and 2 respectively ***Review and further consideration of:*** ➢ The same matters raised in Volume 1 Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24)
Longer term considerations	None identified

What is driving the need to consider this?

See Volume 1 Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24)

What is the 'system' proposed? What are the components that the façade is comprised of?
One Technical Steering Group member stated:

"*If a system (including use of cavity barriers and their fixity) is new and bespoke, it should be justified by test!*"

Building shape and reticulated façade designs
Building shapes have become less 'box-like' and less 'vertical'. Facades are now multi-faceted. Tall buildings particularly, tend to be the canvass for exploring modern building shape(s), façade composition(s) and integration with living gardens.

Typical fire break-out from a post-flashover fire, as it exits a window (which is set in a vertical façade) is well studied and observed. What is not so well studied/observed are fire plumes exiting windows set in unusual, shaped facades (or sited below/adjacent to a step or stagger or unusual façade feature).

Fire breakout from a window/door in modern shaped facades is not so well studied because façade shapes are almost limitless. Envelope shape (e.g. on a building with a curved 'sail-like' façade) may exaggerate the way that fire and smoke 'adheres' to the building surface, allowing the fire to travel from A to B across, up and down a façade (the Coanda effect).

Will a fire spread up a building more than one storey, if the façade leans forward or backwards (and what difference will the prevailing wind make)? Will the fire spread more, if the leaning façade is *forward leaning* (and within a recess in the building envelope) or if it is *backwards leaning* (within a recess in the building envelope) i.e. as though in an inclined 'trench'?

What of reticulated facades? Quite apart from the classification requirement of the components that comprise the wall build-up and the surfaces to BS 13501-1: 2018 [37], the external finish may perform unusually in fire because of the shape of the surface finish. The surface finish may include: tiles, slats/sticks, gauzes, tubes etc) and some or all may incorporate multiple, intimate air voids and channels.

These sorts of buildings need a collaborative design from wind, fire and façade engineers and as one Technical Steering Group member stated:

"*If a system (including use of cavity barriers and their fixity) is new and bespoke, it should be justified by test!*"

Full system testing is needed.
Implications if AD B does not change
Guidance will be seen to be lacking by some users of AD B.

Hot spot: Construction and fixings for cavity barriers (9.13 to 9.16) and Openings in cavity barriers (9.17)

See Volume 1 Hot spot: Provision of cavity barriers (5.18 & 5.19) Construction and fixings for cavity barriers (5.20 and 5.23) and Openings in cavity barriers (5.24) and Volume 2 Hot spot: Cavities (9.1) Provision of cavity barriers (9.2) and Pathways around fire separating elements (9.3) above.

Short term consideration	As above
Medium term consideration	Linear seal standards for a variety of external wall systems ***Consideration to be given to:*** ➢ Full-scale tests ➢ Whether spandrels could play a more important part in building design ➢ What definition of spandrel should be settled on and whether designers can achieve equivalence by use of balconies?
Longer term considerations	As above

What is driving the need to consider this?

Linear seals
What is the correct standard for cavity barriers in curtain walls rainscreens and other systems?
One Technical Steering Group member observed that the curtain wall fire resistance test BS EN 1364-3: 2014 [38] is rigorous because it considers amongst other matters, movement (in different planes) during the test. It is noted that this test is intended for curtain walls requiring fire resistance. Test standards are also needed for other façade build ups, not just curtain walls.

BRE Global notes that BS EN 1364-4: 2014 [39] is intended as a test standard for spandrels in otherwise non fire rated curtain walls, but the tests only look at the spandrel at floor slab edge.

There is still a lack of understanding of the difference between cavity barriers and fire stops.

Unprotected areas
A façade can incorporate 100% unprotected areas if boundary separation allows. This consideration does not address the risk of vertical fire spread from compartment to compartment within the building.

There seems to be a societal shift away from 'tolerating' fire spread in high-rise buildings. The current view may to some extent be a media construct however, in BRE Global's opinion, the emerging 'public view' feels real enough. BRE Global, therefore, senses a real public concern that: a) the façade should not detach and fall to the ground during a fire event and b) fire should not jump from floor to floor.

The typical fire break-out from a post-flashover fire, as it exits a window (which is set in a vertical façade) is well studied and observed. What is not so well studied/observed are post-flashover fire plumes exiting windows (set in unusual, shaped facades or sited below/adjacent to a step or stagger or other unusual façade feature).

Implications if AD B does not change
Guidance will be seen to be lacking by some users of AD B.

Hot spot: Special provisions for car parks (11.1) Open sided car parks- Natural ventilation (11.2) Car parks that are not open -sided (11.3) Natural ventilation (11.4) and Mechanical ventilation (11.5)

Short term consideration	None identified
Medium term consideration	<u>Basement car parks and loading bays</u> ***Could focus on:*** ➢ Fire loads and arrangements in modern basement car parks. ➢ Review and build upon the DCLG commissioned BD 2552 *Fire spread in car parks (2010)* carried out by BRE [40] with emphasis on modern electric vehicles. ➢ Means of escape past fires which can be 'explosive' i.e. lithium-ion runaway reaction fires. ➢ Trends in car park design (compartment size). ➢ Consideration of Part L and insulation to comply with 2022 and future 2025 requirements. ➢ Smoke management systems, and whether to reference Smoke Control Association design guides in AD B. ➢ Whether smoke management is required during the escape and or firefighting and or only the recovery/investigation phase following a fire. ➢ Complications of having very low ceilings (re-radiation of heat) during the firefighting phase. ➢ Ability of fire suppression systems, such as sprinklers or deluge to control or extinguish fires. ➢ The quantity of water required for fighting fires where electric vehicles are involved and how sustainable this is. ➢ Guidance regarding a single stair building's stair not continuing down into a basement. ➢ Power shut-off switches, and where these should be accessed. ➢ 'Other' issues e.g. whether electric vehicles could cause interference with BARIE radios, in large/deep car parks and whether batteries when undergoing runaway reaction(s) create toxic and/or flammable vapours. ➢ The toxicity and density of smoke. <u>Electric vehicles in basement car parks</u> ***Potential for more in-depth consideration:*** ➢ Basement car parks and electric vehicles ***Focus on:*** ➢ Means of escape, to accommodate the 'explosive' nature of electric vehicle fires. ➢ SCA design guides whether they are adoptable. ➢ When smoke management is needed a) the escape phase b) the firefighting phase and c) the recovery phase and whether BS 7346-7:2013 *Components for smoke and heat control systems - Code of practice on functional recommendations and calculation methods for smoke and heat control systems for covered car parks* [41] should be referred to in AD B. ➢ Criticality of ceiling height: low and very low ceilings. ➢ Thermoset insulation boards, fixed to the soffit of the ground floor slab 2022 and 2025 compliant allowable or not? ➢ Size and lack of compartmentation. ➢ Toxicity and density of smoke (escape and firefighting phase).

	➢ Part B5 review for electric cars in basement car parks (consider potential for electromagnetic interference with Fire and Rescue Service radios and inherent safety). ➢ The firefighting medium. ➢ Role of fire suppression/sprinklers/deluge/other. ***Review:*** ➢ Wording in AD B for single stair buildings not continuing down into basement car parks.
Longer term considerations	None identified

What is driving the need to consider this?

Size and shape
Modern buildings can have complex shaped footprints to fit onto tight brownfield sites in city centres. Basement car parks are often multi-levelled and can often serve multi-tenanted properties.

Impulse fans
It is not clear what the role of impulse fans is.

Fire loads in basement car parks and the phasing out petrol and diesel engine vehicles
Naturally ventilated car parks can also have very large fires in them (Kings Dock arena car park fire, Liverpool [42] December 2017 or the Stavanger Airport fire [43] January 2020).

The Government's stated intent is to phase out petrol and diesel vehicles by 2030 and HGVs by 2040. Driven by climate change and UK commitments to reduce CO_2. Fires in car parks in the UK was last researched 12 years ago (three years after the last major revision of AD B took place). AD B has not kept pace with technology change.

The next 10 to 15 years
The need for a period of co-existence of petrol and diesel (and other forms of vehicle including hydrogen [44]) with electric vehicles. The need to keep trends under regular review.

The BD 2552 *Fire spread in car parks* research report for CLG (2010) made it clear that the guidance in AD B at the time (the 2006 edition) was based on car designs which was "decades old". It needs to be reviewed.

Schedule 1 Requirement S*: Infrastructure for the charging of electric vehicles (Requirements S1 to S6)*
Requirement S comes into effect in June 2022 [45]. The guidance in Approved Document S is that the reader should refer to AD B for fire safety considerations. However, AD B does not contain detailed guidance on car parks for electric vehicles. It should be noted that the Fire and Rescue Service believe electric vehicles in basement car parks constitute an unknown risk to firefighters.

Implications if AD B does not change

The risk to firefighters and fire rescue operations in basements

There has been no large-scale contemporary research on electric vehicle car fires in enclosed underground car parks that can underpin assumptions about fire safety in car parks. The guidance in AD B (2006) did not benefit from the BRE research project BD 2552 *Fire spread in car parks* (2010) which itself is in need of review. Accordingly, AD B guidance is considered to be 'behind the curve', with respect to car park fire safety.

Battery fires in vehicles

When battery fires in vehicles fires occur, they can be 'explosive'. The Fire and Rescue Service will not allow an electric vehicle, having undergone a battery fire, to be moved until 48 hours have elapsed. This is because there is a concern there will be unexpected runaway reactions in other fuel cells [46 to 49]. Also, given the increased use of plastics in vehicle bodywork, the fire load associated with car parks is not necessarily a known risk. Approved Document S: *Infrastructure for charging electric vehicles*, assumes AD B currently includes guidance on fire safety in car parks. The assumption is that the current guidance is appropriate for car parks with predominantly electric vehicles. The composition of car parks after 2030, will progress towards 100% (electric vehicle) occupancy. In 2021, sales of electric vehicles (across Europe, and in UK) exceeded of diesel vehicles [50]. This is because petrol and diesel vehicles are being phased out from 2030.

Hot spot: External surfaces (12.5) and Materials and products (12.6 & 12.7)

Short term consideration	Wording clarification ***Consideration could be given to:*** ➢ The wording in Table 12.1, emphasising that 'no minimum performance' and 'no provision' for Assembly and recreation and other buildings respectively, does not mean no requirement. CWCT/SFE guide – Technical Guidance for interpretation in relation to the external walls and specified attachments of relevant buildings in England - Reg 7(2) and Reg 7(3) **Consideration may include:** ➢ If the CWCT guide represents good industry guidance, that could be referenced in any revision of AD B.
Medium term consideration	None identified
Longer term considerations	None identified

What is driving the need to consider this?

The 'no provisions' entry in table 12.1
It was felt that there should be a statement requiring some provision rather than the retention of the no minimum performance and no provision requirements, which are a legacy from Diagram 40. This is not a new requirement but the retention of earlier standards.

CWCT guide – Technical Guidance for interpretation in relation to the external walls and specified attachments of relevant buildings in England - Reg 7(2) and Reg 7(3) (CWCT September 2020) provides practical guidance.
Several respondents believed the current guidance to be too black and white and inflexible. These respondents also believed that Volume 2 guidance should look and feel different from the Volume 1 guidance.

Laminated glass
Respondents asked if the risk of fire spreading from balcony to balconies (above and below) via the laminated glass infill panels is more or less of a risk than a person(s) falling from a balcony should the toughened glass infill break on impact. The question being posed: is the ban creating a new, more realistic risk i.e. falls from balconies and is the risk balanced?

There is a current Workstream to review the ban on combustibles which will consider much of the detail in this Hot spot.

Implications if AD B does not change

Given the review, it is too early to say if there are implications. Await the review of the ban on combustibles.

Hot spot: Materials (12.11 to 12.13) Material change of use 12.14 and Additional considerations (12.15 and 12.16)

See Volume 2 Hot spot: External surfaces (12.5) and Materials and products (12.6 & 12.7) above

Short term consideration	Volume 2 Hot spot: External surfaces (12.5) and Materials and products (12.6 & 12.7) above.
Medium term consideration	None identified
Longer term considerations	None identified
What is driving the need to consider this?	
Volume 2 Hot spot: External surfaces (12.5) and Materials and products (12.6 & 12.7) above	
Implications if AD B does not change	
Given the review, it is too early to say if there are implications. Await the review of the ban on combustibles.	

Hot spot: B5

See Volume 1 Hot spot: Access and facilities for the Fire and Rescue Service B5 above

Short term consideration	None identified
Medium term consideration	None identified
Longer term considerations	<u>All of B5 requires review</u> ***Considerations to include:*** ➢ Current provisions ➢ Emerging provisions/matters which may come to light during a detailed review of B5
What is driving the need to consider this?	
There are so many matters that could be reviewed, and the Fire and Rescue Service concur that there should be a complete review of B5 provisions, a workstream in its own right.	
Implications if AD B does not change	
It is understood that there will be a new DLUHC workstream covering B5. It is too early to say what the outcomes of that review may be.	

Hot spot: Regulation 38

See Volume 1 Hot spot: Regulation 38 above

Short term consideration	None identified
Medium term consideration	See Volume 1 Hot spot: Regulation 38 above
Longer term considerations	None identified
What is driving the need to consider this?	
See Volume 1 Hot spot: Regulation 38 above	
Implications if AD B does not change	
See Volume 1 Hot spot: Regulation 38 above	

Hot spot: Appendix B

See Volume 1 Hot spot: Appendix B above

Short term consideration	None identified
Medium term consideration	***Considerations to include:*** ➢ See Volume 1 Hot spot: Appendix B above
Longer term considerations	None identified
What is driving the need to consider this?	
See Volume 1 Hot spot: Appendix B above	
Implications if AD B does not change	
See Volume 1 Hot spot: Appendix B above	

Appendix H Tables of draft options/recommendations for potential future work for each of the 14 themes pursued during the detailed workshop sessions

This Appendix presents tables of the emerging draft options/recommendations for potential future work (short, medium and longer term) for each of the 14 themes pursued during the detailed workshop sessions for Technical Steering Group member participants, together with drivers and implications for AD B.

Theme 1 Tall building and single stairs

The majority of considerations under this theme relate to buildings in Purpose Group 1: Residential although other purpose groups are also considered.

Short term consideration	Consideration could be given to a 'meanwhile' statement advising on the scope of application of AD B being under review
Medium term consideration	Defining tall, very tall, and ultra-tall (if needed) buildings ***Literature review/research:*** ➢ Literature from other countries and latest information from Town Planning in core cities and consideration from other Part B workstreams . ***Could focus on:*** ➢ Clear definitions so that options for 'scope of application' of AD B can be considered. ***Other:*** ➢ There may be an increase in number of Determinations under Section 16(10) and 50(2) of the Building Act 1984 [1] in the interim to firm guidance.
Longer term considerations	*Review and further consideration of earlier Building Disaster Assessment Group (BDAG) research on the physiological demands on firefighters and any other relevant and more recent research* ***Any review of the earlier BDAG work could focus on:*** ➢ Review the earlier Building Disaster Assessment Group (BDAG) research *Physiological Assessment of Firefighting, Search and Rescue in the Built Environment* (2004) [2] and any other international research e.g. [3] ➢ Single stair buildings in residential use, with extended travel distance in corridors up to 30m long. ➢ Reasonably foreseeable scenarios e.g. the firefighting lift not working during a fire incident. ➢ Stressors e.g. physical exertion required to ascend a number of floors (e.g. 20), on foot, before commencing rescue operations, due to the lift not working. ➢ Whether previous BDAG research findings [2] (of 34m being the upper limit for horizontal travel) hold true today and whether the findings that horizontal 'capacity' drops to 20m if the firefighter has to ascend 20 floors first hold true. ➢ Consideration of compensatory measures to provide mitigation. ➢ Adding to the body of research into the physiological demands on firefighters operating elsewhere in a building e.g. in a basement fire. ➢ The effect of providing 'in-board' stairs (rather than 'out-board' stairs i.e. ones located as close as possible to the external face of the building) and the physiological demands placed on firefighters having to carry breathing

apparatus and firefighting and fire rescue equipment from pump to bottom of firefighting shaft.

Considerations when 'stay-put' in residential use buildings needs to be changed

Research ideas and practical experiments (or modelling) in tall, very tall and ultra-tall single stair buildings

Could consider:

- How well understood 'general needs' is, as a concept.
- Current literature relating to the evacuation of occupants of general needs housing under different circumstances; to better understand the physiological constraints on such 'mixed' populations.
- Some experimental work or modelling to better understand the physiological constraints of such populations egressing down multiple flights of stairs through: a) clear air (no smoke logging) or b) light smoke logging or c) heavy smoke logging (perhaps considering the physiological stressor of descending multiple flights whilst wearing smoke hoods).
- How realistic is it to expect the 'general needs' population to descend 10/20/30 (or more) storeys in a single stair?
- Evacuation using different width stairs.
- What is the 'general needs' population capable of?
- People carrying children or assisting elderly people.
- Whether there is a limit of the maximum number of storeys the 'general needs' population can negotiate?
- Whether rest floors change this limit?
- What about disabled people, for example people with walking impairments or with neurological, cognitive and mental health conditions?
- Requirements for dignified escape?

Note these research considerations may dovetail or run in parallel with the current DLUHC Part B research project on *Means of escape in residential buildings* or others.

Basement car parks and loading bays beneath tall, very tall, ultra-tall single stair towers

Could focus on:

- Fire loads and arrangements in modern basement car parks.
- Review and build upon the CLG commissioned BD 2552 *Fire spread in car parks (2010)* carried out by BRE [4] with emphasis on modern electric vehicles.
- Means of escape past fires which can be 'explosive' i.e. lithium-ion runaway reaction fires.
- Trends in car park design (compartment size).
- Consideration of Part L and insulation to comply with 2022 and future 2025 requirements.
- Smoke management systems, and whether to reference Smoke Control Association design guides in AD B.
- Whether smoke management is required during the escape and or firefighting and or only the recovery/investigation phase following a fire.
- Complications of having very low ceilings (re-radiation of heat) during the firefighting phase.
- Ability of fire suppression systems, such as sprinklers or deluge to control or extinguish fires.
- The quantity of water required for fighting fires where electric vehicles are involved and how sustainable this is.

	➢ Guidance regarding a single stair building's stair not continuing down into a basement. ➢ Power shut-off switches, and where these should be accessed. ➢ 'Other' issues e.g. whether electric vehicles could cause interference with BARIE radios, in large/deep car parks and whether batteries when undergoing runaway reaction(s) create toxic and/or flammable vapours. ➢ The toxicity and density of smoke.

What is driving the need to consider this?

No single issue was identified. A combination of the following appears relevant: a) the desire to maximise return on investment by building high b) seeking to push boundaries (landmark buildings) and c) the desire to 'get the most out of a small plot'. The 2021 survey by New London Architecture [5] shows that 90% of those buildings undergoing Town Planning consideration, in the City of London (Square mile) are intended for residential use.

Guidance documents including Town and Country Planning guidance

The guidance in the Manual to the Building Regulations [6] is that Approved Documents may not be suitable under certain conditions e.g. where buildings are very tall. However, neither the Manual to the Building Regulations nor AD B go on to define tall or very tall. It is noted that AD B uses 'open' terms like *above, more than, over* and *at least*, as well as 'closed' terms like *no more than* and *maximum,* when referring to height. Whilst not the intent of AD B it is perhaps understandable that some users of the guidance interpret 'open' terms, without limitation, literally – hence ever taller buildings continue to base designs on AD B and not BS 7974 [7] and its supporting published documents (PDs).

City plans, such as the London Plan [8], welcome tall buildings; in the right place. The London Plan gives guidance to Local Authorities that they should identify where tall buildings would be acceptable in their boroughs. This is not London centric. In the heart of Manchester is a recently built cluster of four towers Deansgate Square (completed 2020) between 40 and 67 storeys. The tallest tower (South Tower) is a residential tower (200m tall). All four towers have single stair egress. In June 2021, architects unveiled plans to build two additional towers close to Deansgate Square, 51 storeys tall. Current designs show two stairs in the central core of each tower see [9] City-Living: A Building Magazine article [10] notes Manchester's city centre population increased from 10,000 in 2008 to 70,000 in 2018.

The annual tall buildings survey [5] by New London Architecture acknowledges that 18m is a widely regarded trigger, above which one would categorise the building as 'high rise' however, it continues to use 20m as the threshold for its annual survey. The Council on Tall Buildings and Urban Habitat (CTBUH) uses definitions 'tall', 'supertall' and 'mega-tall'. The Shard (London) only just enters the (CTBUH) category of a supertall building by 6.0m. No other building in England would be considered 'supertall'. Other literature/reference sources may provide further perspectives on categories/subcategories of tall buildings.

Diagrams 3.7 and 3.8 of AD B Volume 1 are not relevant to modern design and are not keeping up with smoke exhaust ventilation (See Theme 2 below).

In BRE Global's opinion, a single stair building, as shown in Diagram 3.7, with 7.5m travel in corridors with single direction travel is no longer common; particularly in city centre settings. In BRE Global's opinion and experience, modern designs show single direction travel between 15m and 30m. AD B envisages a maximum single direction travel of only 7.5m.

In a two stair building (see Diagram 3.8(a)) AD B guidance is for there to be a cross corridor doorset located approximately mid-length in the corridor. The corridor could be ventilated on detection of smoke.

The most onerous travel distance would be from a mid-corridor flat where travel from flat entrance door to either stair(left) or cross corridor door (right) would be in the region of 15m. This 15m principle is reinforced in the text below Diagram 3.8(b) *Corridor Access with Dead Ends.*

A single firefighting lift would be required in buildings with a floor greater than 18m above ground level.

The London Plan

The London Plan encourages London Boroughs to consider the importance of inclusion, meeting and outdoor spaces and 'social interaction'. The only way to do this in tower blocks is to consider communal lounges and communal terraces. Large spaces, intended to be used by more than 60 people, require an alternative exit. This now common drive for communal assembly spaces at different levels in blocks of flats, is triggering the need to re-appraise the role of management, consider separate fire detection/alarm, mixed policies on means of escape, compartmentation, smoke control and smoke management and Fire and Rescue Service facilities for intervention.

Disabled people need to be able to access and egress these communal spaces. Consequently, this drives the need to consider management's intentions for evacuation procedures. The London Plan is clear that carry down devices that rely on manual handling of disabled people are not appropriate for dignified escape.
There is confusion between designers, Building Control Bodies and the Fire and Rescue Service as to which guidance should be followed and how to manage/integrate evacuation lifts into stay put strategies.

Relevant requirement O (and AD O: *Overheating* [11])

The new Schedule 1 relevant requirement O: *Overheating* came into force on 15th June 2022. Requirement O requires an assessment of a building's susceptibility to overheat and action (four options) to mitigate the overheating potential:

1) The 'natural' solution, reduce glazed areas, amend layouts and achieve cross flow ventilation. This option may result in new building shapes and or apartments accessed via external balconies.
2) Dynamic thermal modelling whereby it is assumed windows and doors will automatically open when the temperature in a flat exceeds 26ºC during the day or 23ºC at 11pm in summer. The document gives guidance on the use of security grilles and louvres for added security.
3) Mechanical ventilation or
4) Mechanical cooling.

All four options could have different impacts on fire safety.

Thermal insulation

Schedule 1 relevant requirement L: Conservation of Fuel and Power was revised in December 2021. Levels of thermal insulation have increased and will increase again as buildings become net zero in 2025. If flats are to be purge ventilated to prevent overheating and if walls of compartments are better insulated, the time to flashover will reduce.

Other uses (Assembly/Offices)

Landmark buildings in cities have become very tall (ultra-tall) and may remain so given the scarcity of plots available for re-development. Current guidance is that offices do not require compartmentation, irrespective of height. Office buildings without compartmentation do not need to comply with Regulation 7(2).

Implications if AD B does not change

Ever taller buildings using AD B guidance

The guidance of AD B does not set clear upper limits beyond which the document should not be used. The Manual to the Building Regulations suggests that Approved Documents may not be suitable for very tall buildings, but it does not provide a definition of very tall. An alternative view could be that AD B should be providing guidance for very tall buildings with commensurate increase(s) in fire safety provision(s). A discussion is needed on what constitutes tall, very tall and any other iterations/sub-categories of 'tall', lest ever taller buildings will use AD B as a base design document.

Whilst this theme deals with tall single stair buildings predominantly relating to residential use, the Manual to the Building Regulations envisages an even narrower scope of application of Approved Documents whereby if the following 'bars' (also without definition) are triggered that would tend to preclude adoption of guidance in the Approved Documents: a) very large buildings or b) large timber buildings or c) buildings incorporating modern methods of construction.

In BRE Global's experience a debate is also needed on alternative approaches using fire safety engineering that follow BS 7974 and its supporting published documents. The Intent of paragraph 0.13 in AD B Volume 1 and 0.19 in AD B Volume 2 is that when using fire safety engineering to BS 7974, both the main standard and the supporting PDs should form the framework for design. In BRE Global's experience AD B provides the framework – for all but the most unique of buildings e.g. an airport. Scope of application of AD B must be addressed as must be a debate about what is an alternative approach.

The risk to firefighters and fire rescue operations

The Fire and Rescue Service could become increasingly overstretched when operating in tall, very tall, and ultra-tall buildings. Consideration should be given to the physiological limitations of firefighters, working in buildings with a single stair (with a single firefighting lift) and corridors with extended travel distances. The BDAG ODPM commissioned research (2004) suggested maximum firefighter physiological limitations. If the occupant(s) of a flat, located at the end of single direction 30m long common corridor required rescue, it is reasonably foreseeable that the limitations suggested in the BDAG (2004) research would be exceeded.

In BRE Global's view, firefighters may find they are operating at or beyond the very limits of their abilities rather than within reasonable limits, in buildings with extended corridors. Should firefighters discover that the firefighting lift is out of order, this would have an effect on the first responders' abilities to carry out a rescue; given the need to ascend floors (carrying considerable equipment) first. With no built-in 'contingency', firefighters may have to operate beyond safe capabilities and run the risk of injury to themselves and the person(s) being rescued. Extended corridor designs have become common and AD B needs to consider if suitable mitigation is provided or needs to be provided.

There is an increased risk of not being able to carry out firefighting or rescue operations as buildings get to very tall and ultra-tall especially if there is no 'contingency' designed into the system and a key element (e.g. a firefighting lift) fails.

An additional physiological stress occurs if the stair core is some distance 'in-board' of the building (rather than the stair being 'out-board' i.e. close to the external wall). The demand on firefighters, in having to carry breathing apparatus and firefighting and fire rescue equipment from pump to bottom of firefighting shaft should also be a consideration.

The guidance of AD B Diagram 3.8(a) is that both lengths of corridor (each approximately 30m long) could be ventilated. Clearer guidance could be provided on cause and effect expectations for the ventilation of two portions of corridor(s) *at the same level*, where the portions of corridor are separated by a cross corridor fire doorset. Additionally, clarity could be provided on the fire rating of the cross corridor fire doorset – stated as needing 30 minutes integrity in paragraph 3.35 and only 20 minutes integrity at entry 7(a) in Table C1.

Risk to building occupants

There is no data on how far is too far for building occupants to descend. Some research or experimental work might inform debate as to what is possible under different scenarios. For example, it is not known if there should be 'rest floors/lobbies' in very tall ultra-tall buildings.

AD B Volume 1 does not provide practical guidance on the number of stairs in very tall, ultra-tall residential buildings and clearly the risk of being trapped by fire, in building with a single stair, increases with building height. In the absence of AD B guidance, Town and Country Planning is potentially a competing regime stepping in to decide such matters see [12] for an article on a 51-storey single stair tower in East London and [13] for an Architect's Journal article (26th January 2022) asking for clarity on the subject.

See also The Greater London Authority's London Plan Policy D5(B5) for the number of firefighting lifts in buildings, again being determined by Town and Country Planning. The Building Control Service (in a Local
Authority) or an Approved Inspector (in the private sector) has the requisite skills and knowledge to determine these matters if guidance is provided.

In BRE Global's experience, it is common to find the only stair in a tall building continuing down to basement level(s) with a single door separation at ground level and other fire safety provisions at basement level(s). It is therefore common to find that the 'linear route' to compliance is not being followed.

On complex footprints (tight sites) where space is at even more of a premium, the single stair invariably continues down to the basement car park.

In BRE Global's experience, a fire strategy tends to use the provisions of AD B as a *framework for discussion* and justification of 'equivalence', rather than exclusively using BS 7974 and its supporting published documents. Consideration could therefore be given to additional guidance text that acknowledges this tendency to use AD B to act as a *framework for discussion* when justifying 'equivalence'.

Such text could, if considered necessary, set parameters, principles and ground rules around this additional approach. In BRE Global's view, this is required because at present, the current wording under *Fire safety engineering*: Volume 1 (paragraphs 12 and 13) and Volume 2 (paragraphs 18 and 19) is very specific:

> *"BS 7974 and supporting published documents (PDs) provide a framework for and guidance on the application of fire safety engineering principles to the design of buildings."*

The risk to firefighting and fire rescue operations in basements

There has been no large-scale contemporary research on electric vehicle car fires in enclosed underground car parks that can underpin assumptions about fire safety in car parks. The guidance in AD B (2006) did not benefit from the BRE research project BD 2552 *Fire spread in car parks* (2010) [4] which itself is in need of review. Accordingly, AD B guidance is considered to be 'behind the curve', with respect to car park fire safety.

Battery fires in vehicles

When battery fires in vehicles fires occur, they can be 'explosive'. The Fire and Rescue Service will not allow an electric vehicle, having undergone a battery fire, to be moved until 48 hours have elapsed. This is because there is a concern there will be unexpected runaway reactions in other fuel cells [14, 15, 16 and 17]. Also, given the increased use of plastics in vehicle bodywork, the fire load associated with car parks is not necessarily a known risk. Approved Document S: *Infrastructure for charging electric vehicles* [18], assumes AD B currently includes guidance on fire safety in car parks. The

assumption is that the current guidance is appropriate for car parks with predominantly electric vehicles. The composition of car parks after 2030, will progress towards 100% (electric vehicle) occupancy. In 2021, sales of electric vehicles (across Europe, and in UK) exceeded of diesel vehicles [19]. This is because petrol and diesel vehicles are being phased out from 2030.

Increase in level of fire safety provisions commensurate with building height
If buildings continue to get taller, there is a risk that they will be designed without increased fire safety provisions, commensurate with the building's height, particularly for tall, very tall and ultra-tall buildings. For example, at what point might there be a need to have greater than 120 minute fire resistance.

AD B Volume 2 guidance is that in buildings over 45m, with phased evacuation, a stair needs to be discounted. Thereafter, AD B lacks gradual progressive increases (in compensatory features) triggering at other heights say (and for illustrative purposes only) 90m, 135m, 180m (or other intervals). Risks with increasing height need to be defined and AD B needs to consider this. Other current Part B workstreams e.g. the *Trigger Thresholds* project will be examining some aspects of this using fire statistics.

Part L and Part O
The guidance in AD B should consider the risks associated with Schedule 1 relevant requirements O and L (2021 editions). The ventilation requirements of Part O and the thermal insulation requirements of Part L may combine and influence how compartment fires grow and flash over more quickly than before. Part O expects windows in a block of flats to open if the temperature exceeds 23 degrees at 23:00. Should this happen and should the building have a fire event on a hot summer evening, this opening policy could have an effect on vertical (upward) fire spread (through open windows) or vertical downward fire spread if burning brands drop into flats.

It should be possible to predict the effect of the uplift to Part L in 2025 as industry transitions to net zero.

Theme 2 Ventilation/smoke control in modern buildings

The considerations under this theme relate to buildings in Purpose Group 1: Residential.

Short term consideration	Consideration could be given to a 'meanwhile' statement advising on the scope of application of AD B
Medium term consideration	Consideration of the four Smoke Control Association (SCA) guides and Draft BS 9991:2021 which could inform a future AD B review. **Basements** ➢ *Design of Smoke Ventilation Systems for Loading Bays & Coach Parks – a guide for system designers [20].* ➢ *CFD Modelling for Car Park Ventilation Systems – a guide for designers and regulators [21].* **Corridors and stairs** ➢ *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes – Revision 3.1 July 2020) [22]* ➢ *Guidance on CFD Analysis for Smoke Control Design in Buildings (Edition 1.2 June 2021) [23]* Design solutions (using natural ventilation and mechanical shafts) referenced in [22] *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings*

	(Flats and Maisonettes (2020*)* are specifically 'ruled out' by Draft BS 9991:2021 [24] for single stair designs in buildings with a floor at 18m or more, above ground level. This apparent conflict could be considered. Draft BS 9991:2021 supporting free choice for dignified independent escape states at Sections 3.62, 7.6.1 and 54.1: *"[…] all residents are always free to leave their flats if they wish to do so (e.g. if they feel unsafe) […]"* and *"All building users should be able to evacuate from a building as independently as possible."* and *"An evacuation plan should not rely on the assistance of the fire and rescue service."* Consideration could be given as to whether AD B should go as far as Draft BS 9991:2021 emphasising more fully persons' freedom of choice to make independent unaided escape.
Longer term considerations	<u>Smoke control in basements</u> Section 16 in AD B Volume 1 and Section 18 in AD B Volume 2 address *Venting of heat and smoke from basements* but in BRE Global's experience, industry remains confused as to what the intention is for firefighting operations, e.g. whether there is a need to ventilate during the firefighting phase or post fire phase. BRE Global is unaware of research showing the effect of the following on firefighting and fire rescue in modern, large, and complex basements. Such research could be useful when considering future policy. ➢ Different ventilation strategies that support firefighting and fire rescue operations. ➢ Effectiveness of natural ventilation strategies (opening doors to multiple interconnected rooms and corridors) to achieve smoke removal. ➢ Safety of firefighters having to pass through oncoming smoke in order to access a basement fire or having to retreat through the same smoke layer away from the fire in an emergency. <u>Smoke control in extended corridors</u> The intent of smoke extract systems (natural and mechanical) and smoke control systems (pressure differential systems) should undergo a fundamental review in terms of protecting the corridor or stair, or both, etc. and how that is achieved Experimental, and numerical modelling research could evidence effectiveness of smoke control using a) natural smoke ventilation shafts b) mechanical smoke shaft designs and c) pressure differential systems under the differing conditions and provide options for future consideration of AD B e.g.: ➢ Fire loads and fire dynamics in modern designed* flats (see also Theme 8 *Fire load review*). ➢ Consider what a modern flat would look like in five years' time, as the industry takes its last 'thermal' step to net zero construction, and consider fire loads and fire dynamics. ➢ Ventilation controlled fires in well-sealed, highly-insulated compartments, a) large open plan flats and b) traditional cellular flats.

	➢ The effect of Part O: *Overheating*, on fire growth and fire dynamics in highly-insulated compartments, a) large open plan flats and b) traditional, cellular flats. ➢ Effect of wind a) entering a compartment of fire origin via open/broken windows, b) pressurising the windward walls and creating suction forces over leeward walls and roof, c) and stack effect in service risers and stair shaft. The effect of all these considerations (on tenability criteria in the common corridors) when the door to the flat of fire origin is opened for firefighting in *very tall* and *ultra-tall* buildings. ➢ Consideration also to be given to leakage into the common corridor prior to the arrival of the Fire and Rescue Service should other residents decide to leave their flats. The study should consider the effect of wind speed at different heights in buildings. ➢ Corridor shape/length. ➢ Tenability conditions in common corridors after a flat front door is opened for firefighting and rescue purposes. Consider a flat closest to the stair and one remote from the stair. ➢ Where tall buildings in close proximity to a building under consideration could cause 'wind tunnel' effects and therefore become a material consideration.

What is driving the need to consider this?

Increasing use of basements

Concrete technology and concrete placement techniques including jointing and sealing have improved. Concrete can now be specified to BS 8102:2009 *Code of practice for protection of below ground structures against water from the ground* [25] to grade 3 ('dry') meaning the concrete can now have high levels of vapour resistance. Basements are now the location of choice for plant rooms as well as other spaces such as loading bays, waste and cardboard compactors, gymnasiums, bicycle stores and other long-term storage areas.

Basements are often more than one level deep.

Means of escape in basements plant rooms is often designed as inner rooms or even inner-inner rooms (the latter on the basis they are either permit to work places or spaces into which people do not normally go).
Providing plantrooms in basements allows the top storey in blocks of flats to be given over to penthouse apartments.

Extended corridors serving flats on upper floors

The provision of a second stair in a residential building has implications for building layout; with a commensurate reduction in the number of apartments that can be built.

Single direction access corridors in residential buildings are now frequently up to 30m long.

The AD B guidance (if following the 'linear route' is that single direction horizontal travel is limited to 7.5m. In BRE Global's opinion it is now commonplace for there to be extended single direction horizontal travel in common corridors up to 30m long, served by a single stair. The guidance in AD B could be reviewed to provide for 'linear route' compliance at these common extended distances.

Smoke control in corridors on upper floors

Designers frequently follow the Smoke Control Association *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (2020) and Guidance on CFD Analysis for Smoke Control Design in Buildings* (2021)

Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 [26] to protect the stair, lobby, and lifts.

Implications if AD B does not change

Smoke extract in basements with complex layouts

AD B acknowledges site constraints and designs can result in interconnecting doors of multiple spaces (and corridors) needing to be opened for ventilation during firefighting and rescue. The Fire and Rescue Service's concerns relate to the need for firefighters to go against the flow of hot smoke in order to access the room of fire origin and, should a rapid retreat be needed, firefighters may need to travel through the smoke to egress the building.

Mechanical ventilation of common corridors in blocks of flats (to protect the stair)

AD B gives guidance on natural and mechanical ventilation systems to protect the stair and envisages single direction horizontal travel of up to 7.5m long and corridors with two directions of travel up to 30m long between stair and cross corridor doorset. Where a mechanical system is adopted, AD B envisages it will be a pressure differential system to BS EN 12101-6. In BRE Global's experience, modern designs favour the use of mechanical smoke shaft (extract) systems in accordance with the SCA guidance (in order to maximise lettable floor plates) and these systems serve single direction horizontal travel in common corridors up to 30m long. AD B guidance is that BS EN 12101-6 (pressure differential system) is to be adopted to protect the stairs.

Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 to protect the stair, lobby, and lifts.

Current designs, approved by the Authority Having Jurisdiction, are for single direction horizontal travel distances up to 30m and mechanical smoke shaft ventilation systems. Designers submit: a) designs in accordance with the Smoke Control Association Guide *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes) (2020)* and b) *Computational Fluid Dynamics (CFD) modelling*. There are differences of interpretation between Fire and Rescue Services, Authorities Having Jurisdiction and Design Fire Engineers as to what is 'the' correct way to demonstrate compliance. See Architect's Journal article [13], 26th January 2022 asking for clarity on number of stairs. This is currently being driven by Town Planning.

Mixing and matching guidance

AD B guidance paragraph 0.9 advises against mixing and matching guidance documents, where alternative publications are adopted. The exception to this is where the AD B specifically suggests using alternative guidance for a particular aspect of design. Designers of single stair buildings with extended corridors (up to 30m long) typically use AD B for guidance but 'change track' to use the SCA and CFD modelling 'route' before reverting to AD B to complete other aspects of the design. AD B could consider if the SCA guides or other, should be endorsed.

Ongoing concerns

Articles in the media may tend to erode public confidence in fire safety systems for other reasons such as maintenance testing. A news article [27] accurately reported that a smoke ventilation system did not 'work in practice' and reiterated the Fire and Rescue Service guidance that building owners should check systems are in full working order. Building owners need to maintain and check installed systems are kept in good working order. Industry needs to test these smoke control systems to demonstrate they 'work in practice' under exacting conditions e.g. wind pressure conditions in tall, very tall, and ultra-tall buildings and when the flat door (very close/opposite the stair) is opened during escape, or firefighting mode.

Dignified escape

The guidance in AD B (Volume 1 Paragraph 3.3) makes a statement that:

> "[…] *Sufficient protection to common means of escape is necessary to allow occupants to escape should they choose to do so* […]"

The guidance in Draft BS 9991 (Section 3.62, Section 7.6.1 and Section 54.1) describes persons freedom of choice to make independent unaided escape:

> *"...all residents [should be] free to leave their flats if they wish to do so […] "*
> and
> "*All building users should be able to evacuate from a building as independently as possible"*
> and
> "*An evacuation plan should not rely on the assistance of the Fire and Rescue Service*".

The Draft BS guidance is that evacuation lifts can be automatic with pre-programmed information or they can be 'driver-assisted'. The guidance considers management obligations during a fire.

The current guidance in AD B seems therefore to be 'out of step' with modern building design.

The matters currently being considered in Draft BS 9991:2021 may be of merit for review for AD B.

Theme 3 Complex footprints

Short term consideration	Consideration could be given to a 'meanwhile' statement advising on the scope of application of AD B.
Medium term consideration	Similar considerations to Theme 1 *Tall building and single stairs* and Theme 2 *Ventilation/smoke control in modern buildings* apply to this theme.
Longer term considerations	Questions remain which, if resolved, could lead to a greater uptake of modular construction. **Consideration may include:** ➢ Agreement on what constitutes full-scale test evidence. ➢ How modules perform a) during a fire* and b) under additional post fire testing**. ➢ How stability of modules can be assessed after a fire event, to facilitate further work of emergency services and others. ➢ The effect of reasonably foreseeable events over the life of the building (e.g. burst water pipe or leaking waste pipe) on friction fitted cavity barriers. Might such barriers, if wet, slump undetected rendering them ineffective? ➢ The effect of thermal movement or building sway on friction fitted cavity barriers. ➢ How such barriers can be tested – new test standards. ➢ Understanding of flame extension in small voids between modules. ➢ Frequency of condition surveys to check linings protecting structural elements. Note. Currently AD B does not consider disproportionate damage and fire spread caused by an initial localised explosion. Greater confidence in robustness of modern methods of construction would result if it could be demonstrated that disproportionate fire damage is unlikely to occur even after a reasonably foreseeable minor 'event' occurs either before or during a fire event. The damage

	caused by a localised explosion may be relatively easy to model mathematically and consideration could be given to its impact on local redundancy of structural members [28] and [29] and the effect of fire on resulting structure. * Note 1) Considerations of how units perform under fire may dovetail or run in parallel with the current MH Structural fire resistance and fire separating elements workstream also arising from the Technical Review of Approved Document B (2019) **Note 2) Post fire testing could include BS EN 1363-2:1999 *Fire resistance tests - Alternative and additional procedures* [30] e.g. impact testing at the end of standard fire resistance testing. Other additional tests could be considered and included in a British Standard or Code of Practice, which could help to give confidence in the robustness of an assembly, post standard fire testing. A national test could address similar issues to UL ASTM E119-12 *Standard Test Methods for Fire Tests of Building Construction and Materials* [31] which results in a tested 'assembly' being subjected to water jets at 3.1 bar immediately after a fire resistance test to simulate the force of firefighting water being applied.

What is driving the need to consider this?

Increasing use of modular construction

Where sites are complex and plots small (typically island sites or those fronting major roads) it is in the contractor's interest to find systems of building that speed up the build process. A building's carbon footprint now includes all construction activities. Cutting down on heavy goods vehicle movements reduces harmful emissions (dust, soot and NO_2) and this is likely to be a KPI with respect to a construction company's environmental policy under ISO 14001 [32]. Lastly, there is a focus on reducing disruption to the local community, accordingly, Planning Authorities are likely to consider quicker forms of construction more favourably.

The Institute for Public Policy Research (IPPR) paper [33]: *What more can be done to build the homes we need (June 2017)* supported diversification in housing supply noting:

> *"[…] modular construction, could deliver units 30% quicker and 25% cheaper [than traditional]*

One modular manufacturer claims their projects can save 50% to 60% on programme, a considerable 'uplift' on the IPPR claim of 30%. The same manufacturer cites 80% fewer vehicle movements as a result of modular building.

Housing Communities and Local Government Select Committee work

On 3rd July 2019, the Housing Communities and Local Government Select Committee produced its report on *Modern Methods of Construction* [34] which sought to determine how to speed up housing supply and meet government targets on reducing carbon emissions.
It concluded one barrier to the use of MMC was the building regulations and the Approved Documents citing:

> *"[…] homebuilders told us it is difficult to apply the guidance to MMC buildings. We welcome the Government's review of Approved Documents […] but the review should go further and consider specific guidance for homes manufactured off-site."*
> And
> *"The […] review should consider how the Approved Documents relate to MMC buildings and where relevant, provide additional guidance on how MMC homebuilders might reach the required standards."*

Concerns over fire performance

The fire performance of heavy steel is well understood. The importance of connections in steel structures (comprising I and H sections from 40kg/m to 137kg/m) and lightweight steel compartment

wall deflection heads became better understood following the experimental work in the mid 1990's at the BRE Cardington facility. BRE Global is unaware of independent large-scale experimental research on the fire performance of different types/forms of modular construction, and therefore, their performance remains something of an unknown. Some regulators are concerned that buildings are being built without repeatable full-scale testing to give absolute confidence in these modular technologies. Such large-scale experimental testing is intended under the current DLUHC workstream *Structural fire resistance and fire separating elements.*

Extended corridors serving flats on upper floors
See Theme 2 *Ventilation/smoke control in modern buildings*, which would be relevant where extended corridors occur in conjunction with modular buildings.

Smoke control in corridors on upper floors
See Theme 2 *Ventilation/smoke control in modern buildings* which would be relevant here.
Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 [26] to protect the stair, lobby, and lifts and non-combustible construction.

Implications if AD B does not change

Increasing use of modular construction
Industry and the select committee are asking for guidance on modular construction. The Housing Communities and Local Government Select Committee is asking for guidance for MMC – they state:

> *"The current suite of Approved Documents is confusing and difficult to comply with. It is particularly difficult for homebuilders that use MMC to apply the regulations to their developments. This could result in compromised safety standards in MMC buildings.*

Extended corridors serving flats on upper floors
Theme 2 would be relevant for MMC which can also be constructed with extended travel in single direction.

Smoke control in corridors on upper floors
See Theme 2 which would be relevant here. Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 to protect the stair, lobby, and lifts and non-combustible construction.

The current guidance in AD B seems therefore to be out of step with the advances in MMC.

Theme 4 Alternative transport: Electric vehicles and Theme 5 Batteries

Short term consideration	None identified
Medium term consideration	Electric vehicles ***Review the report BD 2552 Fire spread in car parks for CLG (2010):*** ➢ The review should start with BD 2552 and go on to consider other more recent research to provide insight as to the modern issues relating to electric vehicles and car parking. ***Focus on:*** ➢ Characteristics of fires in battery powered vehicles (initiation and fire spread). ➢ Relationship with vehicles powered by other technologies (petrol, diesel bio-fuel, hybrid, gas). ➢ The role of fire suppression/sprinklers/deluge/other. ➢ Car stackers. ➢ Firefighting considerations in confined space dealing with potentially 'explosive' fires.
Longer term considerations	Electric vehicles in basement car parks ***Potential for more in-depth consideration:*** ➢ Basement car parks and electric vehicles ***Focus on:*** ➢ Means of escape, to accommodate the 'explosive' nature of electric vehicle fires. ➢ SCA design guides whether they are adoptable. ➢ When smoke management is needed a) the escape phase b) the firefighting phase and c) the recovery phase and whether BS 7346-7:2013 [35] should be referred to in AD B. ➢ Criticality of ceiling height: low and very low ceilings. ➢ Thermoset insulation boards, fixed to the soffit of the ground floor slab 2022 and 2025 compliant allowable or not? ➢ Size and lack of compartmentation. ➢ Toxicity and density of smoke (escape and firefighting phase). ➢ Part B5 review for electric cars in basement car parks (consider potential for electromagnetic interference with Fire and Rescue Service radios and inherent safety). ➢ The firefighting medium. ➢ Role of fire suppression/sprinklers/deluge/other. ***Review:*** ➢ Wording in AD B for single stair buildings not continuing down into basement car parks. Energy storage ***A focussed review and consideration of:*** ➢ Any energy storage centre fires in buildings in the UK and worldwide, the fire behaviour and its effect on the building(s), whether the fires were contained or not and any learning for means of escape for building occupants and access and facilities for Fire and Rescue Services.

What is driving the need to consider this?

Phasing out petrol and diesel engine vehicles
The intent to phase out petrol and diesel vehicles by 2030 and HGVs by 2040. Driven by climate change and UK commitments to reduce CO_2. Fires in car parks in the UK was last researched 12 years ago (three years after the last major revision of AD B took place). AD B has not kept pace with technology change.

See recent fires: Liverpool Echo arena fire December 2017 [36], the Douglas Village Shopping Centre fire Cork [37] and the Stavanger airport car park fire [38].

The risks to firefighters
Firefighting in basements is problematic given the re-radiation of heat from concrete and other surfaces, giving rise to heat build-up in confined space and smoke management considerations.

There is a danger of reignition of a car battery hours/days after an initial fire event. Implications for firefighting resources. Little known by the Fire and Rescue Service as to how to fight such fires.

Compliance with Part L
Use of rigid foam thermal insulation on ceilings of car parks provides additional fire load.

The next 10 to 15 years
The need for a period of co-existence of petrol and diesel (and other forms of vehicle including hydrogen [39]) with electric vehicles. The need to keep trends under regular review.

The BD 2552 *Fire spread in car parks* research report for CLG (2010) made it clear that the guidance in AD B at the time (the 2006 edition) was based on car designs which was "decades old". It needs to be reviewed.

Schedule 1 Requirement S*: Infrastructure for the charging of electric vehicles (Requirements S1 to S6)*
Requirement S comes into effect in June 2022. The guidance in Approved Document S is that the reader should refer to AD B for fire safety considerations. However, AD B does not contain detailed guidance on car parks for electric vehicles. It should be noted that the Fire and Rescue Service believe electric vehicles in basement car parks constitute an unknown risk to firefighters.

Energy storage centres
Large energy storage centres may be located in the open air (i.e. not within buildings). A large fire occurred in an open-air facility in Geelong, Victoria, Australia in August 2021 in one 450 MWh energy storage unit and spread to another unit; the fire burned for four days [40].

Another international fire that BRE Global reported on, occurred on a rooftop of a building in Beijing, China in April 2021 at the Jimei Home Dahongmen store [41]. The battery facility was reported to be the world's largest user-facing energy storage system (25 MWhdc). The fire involved a rooftop array of battery storage units and was linked to a 1.4MW solar generation facility. The fire spread to the shopping centre but the extent of fire damage to the shopping centre was not reported. It was reported that an explosion occurred during firefighting, killing two fire-fighters and injuring a third. A member of staff from the shopping centre was unaccounted for. The cause of the fire was reported to be the lithium-ion phosphate battery.

Implications if AD B does not change
Car park fires BRE Global is unaware of large-scale contemporary research into electric vehicle car fires in enclosed underground car parks in the UK that could be used to underpin assumptions about fire safety for building users and/or firefighters. Such fires may represent a danger to Fire and Rescue Service personnel. Letting fires burn out is not tenable because of the propensity for Lithium-ion batteries to re-ignite [42]. The fire load is unknown and significant fires may cause disproportionate damage or collapse of a building/part of a building [43]. Schedule 1 relevant requirement S: Infrastructure for the charging of electric vehicles AD B guidance needs to be based on research. The significant considerations for electric vehicle fires in basements are that they burn 'explosively', they have a propensity to re-ignite, they require significantly more firefighting medium and the Fire and Rescue Service has no evidence of how to fight such fires. Energy storage centres If the fire in Beijing in April 2021 is an indicator what could happen in energy storage centres in buildings in England, further consideration of fire safety measures is needed. The Beijing fire required a Fire and Rescue response of 235 firefighters and 47 appliances. Media reports of the duration of the fire suggested that it burned for either 12 hours or significantly longer and a sudden explosive event during the fire resulted in firefighter fatalities and an injury and an employee was accounted for. This is a new and emerging fire risk and has significant implications for the Fire and Rescue Service.

Theme 6 Alternative fuels and Part L

Short term consideration	None identified
Medium term consideration	Consider if hydrogen gas guidance is sufficient and if special pipes are required to convey the gas to avoid metal embrittlement provide guidance.
Longer term considerations	See experiments suggested under Theme 8 *Fire load review*.

What is driving the need to consider this?
Alternative fuels – Hydrogen There may be a drive to replace natural gas with hydrogen gas. For example, Leeds City Council is working with Northern Gas Networks to transition to 100% hydrogen replacing natural gas across the city. It may be that the network for gas distribution pipelines is not suitable for hydrogen gas in all instances. If research evidences that there are issues to consider, then AD B guidance paragraphs 3.80 and 7.27 may need to be revised. Part L The revisions to Part L *Conservation of fuel and power* (December 2021) come into effect on 15th June 2022. The change to Part L in 2022 is intended to achieve a 31% reduction in CO_2 emissions. In 2025, a larger and final change comes with a further 44% reduction in CO_2 emissions. In recent years, there has been a wider societal focus on the thermal insulation standards of housing in the UK and the implications of climate change and wider sustainability considerations [44].

Increases in thermal insulation The greater the thermal insulation on walls roofs and floors, the greater the reflected heat energy, during a fire. Heat energy not passing through walls, roof, and floor of a compartment will be reflected back to the compartment. If there is sufficient oxygen, it is evident fires will reach flashover more quickly.
Implications if AD B does not change
Hydrogen The guidance paragraphs of 3.80 and 7.27 in Volume 1 and 3.39 and 8.37 in Volume 2 may need to be reconsidered if hydrogen gas becomes an alternative fuel choice? Each revision to Part L will impact on Part B. Fires in compartments will get hotter, and have faster growth as a result of more thermal insulation being provided to elements of structure. The new Schedule 1 Relevant Requirement O: *Overheating* also needs to be considered, as any sudden introduction of ventilation to a fire in a compartment that is highly thermally insulated will bring rooms of fire origin to flashover sooner.

Theme 7 Part B5 review

Short term consideration	None identified
Medium term consideration	See below
Longer term considerations	All aspects of B5 (Access and facilities for the Fire Service) The Technical Steering Group agreed that the whole of B5 needs a fundamental review: vehicle access, fire mains and hydrants – flats and other buildings, access to buildings for fire-fighting personnel – flats and other buildings, venting of heat and smoke from basements – flats and other buildings. It may be that as a result of this review, additional guidance covering new provisions may be identified. Some of these may be medium term outcomes. Note. It is understood that there is intended to be a new Workstream to review B5 provisions.
What is driving the need to consider this?	
Modern building designs and modern building use are resulting in B5 provisions being outdated and therefore in need of fundamental review. This results in the access and facilities for Fire and Rescue services being outdated and possibly inappropriate for modern day fire rescue and firefighting. There is crossover with all themes above but Technical Steering Group members felt all of B5 needs a review in its entirety.	
Implications if AD B does not change	
Firefighter safety and efficiency may be further compromised and this may result in Fire and Rescue Services unable to deliver their core functions.	

Theme 8 Fire load review

Short term consideration	Guidance/mitigation could be considered/reviewed/reiterated regarding the fire risks associated with open-plan ground floor layouts in dwellings and material alterations
Medium term consideration	Review and characterise modern fire loads in residential buildings ***To consider:*** ➢ Review of literature, for example OPSS BEIS commissioned study *Characteristics of modern domestic fires and the Implications for product performance testing* [45] for residential use. ➢ Consideration of relevant recent overseas data e.g. USA. However, care should be taken with the interpretation of existing overseas data, as this is unlikely to fully represent modern dwelling fires in the UK. ➢ Conduct fire load survey in residential buildings. ➢ Experimentally characterise fire loads in terms of HRR. Conduct experimental programme(s) ***Could consider:*** ➢ Comparative experiments evidencing heat release and the time to flashover, between room compartments constructed from modern materials (with modern levels of insulation and furnished with modern furniture/materials and consumer goods) and older constructions. ➢ The current Part L: *Conservation of fuel and Power* and the uplift expected in 2025 (net zero) to determine the implications of the improved thermal insulation standards on fire growth and development. ➢ The current Part O: *Overheating* for cellular and open-plan dwelling layouts to determine the implications for fire growth and development. Additional consideration could be given to the implications of modern building (Residential use) with highly insulated and low air leakage envelopes where Part O: *Overheating* will be complied with by mechanical ventilation or cooling rather than purge ventilation. Further research ***Could review:*** ➢ Lithium-ion battery fires to determine emerging trends and link back to Themes 4 and 5. ➢ Part of the BEIS (OPSS) study: *Characteristics of modern domestic fires and the Implications for product performance testing* (2020, to be published) [45], to see if trends identified remain, or appear to be being mitigated or are worsening and the part played by white goods in fires initiation and heat output. ➢ Whether any evidence points to protected halls in flats needing higher levels of fire resistance. ➢ The effect of changes that arise from any revisions/amendments to the Furniture and Furnishing (Fire) (Safety) Regulations 1988 [46], i.e. new industry solutions to remain compliant which may emerge over time. All other purpose groups ***Review and characterise modern fire loads, conduct experimental programme(s) and take into account any further research:*** ➢ Fire statistics regarding modern offices and all other purpose groups. ➢ Fire trends and developments in compartment sizes and choice of cladding material in tall, very tall and ultra-tall buildings of other purpose groups e.g. offices. ➢ All other purpose groups to determine whether any new purpose group trends emerge e.g. smaller replenishment centres in cities.

	Ancillary spaces in blocks of flats ***Review guidance:*** ➢ To determine whether it is sufficient or needs to become more comprehensive. Combustible construction ***Focus on:*** ➢ Whether AD B might be better served split to address combustible construction separately from non-combustible construction (i.e. in separate volumes). ➢ Whether such a split might also feed into the considerations under Theme 1 *Tall building and single stairs* regarding tall, very tall and ultra-tall buildings. Note. It is assumed that mass engineered CLT structures form part of the Structural Fire Resistance Workstream and is not detailed here. It is assumed that balcony fires and fire spread across balconies form part of the Balconies and spandrel panels Workstream and is not detailed here. Places of special fire risk ***Review guidance:*** ➢ Relating to 'places of special fire risk' which appear to be outdated. Of particular concern is battery technology, including energy storage centres, and the new risks that these present. It seems that this modern technology results in 'explosive' fires of long duration. See Theme 5 *Batteries* subheading 'energy storage centres'
Longer term considerations	See also research suggestions under Theme 2 *Ventilation and smoke control in modern buildings.*

What is driving the need to consider this?

Shorter time to flashover

Relevant published literature on fire load energy density and fire risk of consumer products for UK dwellings is dated, generally of the order of 20 years old. This is unlikely to be representative of modern dwellings. Relevant published date on this issue is mostly based on overseas data. Care should be taken with the interpretation of overseas data as it is unlikely to be fully representative of modern dwelling fires in the UK.

Research from USA [47] suggested construction materials and typical furniture and furnishings of modern buildings were combining, leading to compartment fires flashing-over more quickly than was the case with 'old construction, furniture and furnishings.' A similar observation was made by researchers in India that fire loads in office and student accommodation in 2018 were up to three times greater than they were 20 years ago and they attribute this to more use of plastics and a reduction in cellulosic material [48]. See also Theme 6 *Alternative fuels* and Part L subheading 'Increases in thermal insulation'.

Trends in ways of living in England

There has been a noticeable trend towards open-plan living in the past two decades. Open-plan layouts are frequently desired in single family dwellings undergoing material alterations to create additional storeys, irrespective of height to the topmost habitable storey and the usual requirement to protect the stairs.

Open plan living increases fuel distribution, and enclosure ventilation. Fires can spread to several storeys and are considerably larger and present a greater danger to means of escape. Homes have a greater polymeric material in them than two decades ago. There may be changes to the Furniture and Furnishing Regulations (see below). Homes have more white goods in them than two decades ago

and there are new sources of ignition from lithium-ion batteries e.g. laptop computers, mobile phones, e-cigarettes, e-bikes, hoverboards, electric scooters, mobility scooters, and cordless DIY tools etc.

Working patterns during the COVID-19 pandemic has resulted in a greater emphasis on working from home. Working from home, by necessity, results in a greater use of IT and electronic equipment and office furniture. This increase in fire load should form part of any consideration of fire load density in residential use buildings.

Lithium-ion batteries

In the early 2000's, petrol fuelled gardening tools would probably have been stored away from the dwelling in a garage/garden shed. In 2022, it would not be uncommon to find cordless gardening tools stored within the dwelling.

An ageing population is more likely to use mobility scooters powered by lithium-ion batteries than 'old' technology batteries because of the longer battery life associated with lithium-ion technology.
Other goods such as 'children's toys', e-bikes [49], hoverboards and electric scooters are also powered by lithium-ion batteries. The fire load in the modern home has changed since the early 2000s [45].

Changes to Furniture and Furnishing Regulations

The Furniture and Furnishings (Fire) (Safety) Regulations 1988 (as amended) are now under review by the Office for Product Safety and Standards. A major driver for the review has been the health and environmental impact (by ingestion and bio-accumulation respectively) of fire-retardant chemicals.

The precautionary principle suggests it would be advisable to determine fire loads in modern homes and carry out compartment fires using 'new technology' furniture versus 'old technology' furniture as primary or secondary ignition sources.

It may be advisable to revisit any experimental work if and when the regulations are amended to see how interior designs change over time to accommodate new regimes.
In addition to flammability and fire load, toxicity could be another 'metric'. See also the output considerations of Theme 2 *Ventilation smoke control in modern buildings*. This research may affect assumptions about AD B from B1 to B5.

Mass Engineered Timber: Cross Laminated Timber (CLT)

There is appetite and desire to construct in Mass Engineered Timber e.g. using CLT. At present, the tallest residential buildings constructed from CLT in England, remain of the order of 10 storeys [50] but clearly the driver is for ever taller buildings in timber [51].

Ancillary spaces

It is not uncommon for residential tower blocks to include ancillary spaces; it is the scale of provision that has changed over the last two decades. A typical 2000's residential block of flats would have included some ancillary accommodation (e.g. a bicycle store, bin store, toilets and or a mail room) accessed via protected lobbies off the entrance lobby. The following example of a 47-storey block of co-living flats is taken from a London Borough Council's Planning website. Drawings of this scheme show the scale of provision of 'ancillary' accommodation at ground, mezzanine, first, second, penultimate floor and roof garden, in 2022. Schemes differ but there does seem to be a design intent to maximise 'ancillary'. Another change that came into focus (in response to the need to isolate and work from home during the COVID-19 pandemic lockdowns) is society's use of parcel delivery services. This naturally leads to considerations like whether mail rooms in blocks of flats need to be larger to accommodate parcel deliveries and whether a building's cardboard waste compactor is too small and lastly how the cardboard waste will be managed.

Balconies

Winter garden balconies are becoming a popular design choice in the private rented sector and as these can end up 'furnished'. Such furnished areas in effect extend the floorplate and add to the fire

load risk. The combination of building shape (with recesses and dogleg returns) and wide balconies is seen as being a reasonably foreseeable risk to fire spread. A concern is that, if a fire in an apartment spreads to its balcony, the growing fire could spread across to neighbouring balconies. This is a concern where the building has recesses and offsets in the façade and where sections of balcony are separated by small, non fire rated privacy screens.

Offices
The trend is for more open plan and less cellular office space. There is no requirement for compartment floors in office use. The office of twenty years ago 'worked' nine to five, whereas the modern office is designed for 24 hour working. The company 'of old' had its office or it had a floor in an office building. The modern company has its office on any floor level it chooses to occupy [52] and it probably collaborates with other companies. Even though modern offices are often left with concrete ceilings and concrete walls, are the furniture and furnishings and floor coverings different [53] and is the flooring becoming a consideration for fire load?
Lastly, is the transient nature of the modern occupancy (your co-tenant) the new risk? One tenant may have a different 'world view' as to what is a fire risk (overloading a socket or charging laptop with an incompatible charger) to another tenant.

Shops and commercial, Industrial and storage
The established model for replenishment centres is that they will remain vast in scale, be occupied by large workforces and spaces inside may be complex, with great reliance on use of mezzanine floors for storage and sorting. Alternatively, they may become automated with greater use of robots and less reliance on human intervention. The scale of the undertaking would tend to suggest these facilities will remain out of town.

An alternative model could be that there need to be many more, but smaller replenishment centres located in and around cities to satisfy the same day 'click and deliver' societal expectation. If this alternative model predominates this would suggest many more replenishment centres appear in and around in cities and these may introduce fire risk into mixed-use buildings.

Places of special fire risk
The use of products and equipment containing Lithium-ion batteries is now well established and will continue to grow.

In complying with Schedule 1 Requirement Part L *Conservation of fuel and power* and the wider need for sustainable construction, it is highly probable that more buildings will be constructed with energy storage centres. Rooms and spaces containing products and equipment containing Lithium-ion batteries and units comprising energy storage centres may need to be reconsidered in terms of fire and explosion resistance.
See also Theme 5 *Batteries* subheading 'Energy storage centres'.

Implications if AD B does not change

Changes to fire load and fire growth
Understanding of speed of fire growth and factors affecting time to flashover and overall fire load could be based on outdated assumptions unless studied and monitored and may have implications for the provisions in AD B for B1 to B5 compliance.

Open plan dwellinghouses
Fire and smoke can spread rapidly throughout open plan accommodation and means of escape can become compromised if the stairs are unprotected. It seems the linear route to compliance and the need to protect the stair in buildings of three or more storeys is not being followed/understood. Review of options or firmer reiteration of guidance may suffice.

Speed of fire growth and means of escape (particularly in combustible construction)

AD B needs to remain up to date on changing fire loads with combustible construction. See the vital part that a community played in assisting the evacuation of an extra care facility, built of combustible construction, where the fire spread rapidly throughout the development. This fire occurred mid-afternoon, not at night [54].

Part L and Part O

Buildings are becoming more highly insulated, fires may burn in compartments and become ventilation controlled. More airtight structures might mean fires are not discovered until significant smouldering combustion has first taken place. This has implications for:

a) occupants in the flat who might be sleeping and unaware of a fire in its early stages.
b) the Fire and Rescue Service who may attend the fire sometime after fire initiation. Under these circumstances the immediate danger could be the potential for backdrafts on opening the flat front door.
c) smouldering fires which spread into the structure of combustible construction and remain 'relatively unseen'. This may have implications for a ‘stay put’ fire strategy i.e. where a smouldering fire, burning for some time, can transition to flaming combustion on introduction of ventilation.

If fires occur in ventilated compartments in tall and ultra-tall buildings, the effect of wind pressures may ventilate the fire such that flashover occurs very quickly.

Ancillary spaces

AD B needs to remain current and ‘ahead of the curve’ in understanding how these spaces are being used in modern buildings, the risks they pose for fire initiation and spread and the risk to occupants on escape routes.

Batteries and white goods

The risks associated with lithium-ion battery fires and white goods fires needs to be continuously monitored [55, 56 and 57].

The Furniture and Furnishings (Fire) (Safety) Regulations 1988 (as amended)

Changes to the regulations should be monitored to see if there are implications for Part B.

Changes to office and shop/storage buildings

AD B needs to remain current and ‘ahead of the curve’ in understanding how these use classes may change.

Places of special fire risk

Rooms and spaces containing products and equipment containing Lithium-ion batteries and units comprising energy storage centres may need to be reconsidered in terms of fire and explosion resistance.

The current guidance in AD B seems therefore to be out of step with advances in battery technology and energy storage centres.

See Theme 5 *Batteries* subheading ‘Energy storage centres’.

Theme 9 New ways of building: Other

Short term consideration	None identified
Medium term consideration	Green walls ***Review and further consideration of AD B Best Practice guidance on Fire performance of green roofs and walls (2013) [58]:*** ➢ Limited testing to BS EN 13823 *Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item* [59] was a consideration behind the 2013 guidance. Carrier 'pots' and the actual plant material could not be tested. Assuming there may have been technological advances in the intervening nine years, perhaps the testing of the 'technology' could be reconsidered. ➢ Tests on larger panels (e.g. intermediate-scale rigs) may now be possible. An advantage of using larger rigs might be that some natural growth on the rig could be encouraged before testing e.g. one or two or more seasons of growth should be able to be accommodated. Consideration may need to be given to separate guidance when a vertical forest 'approach' [60] is proposed and this seems to 'go further' than typical green walls. The vertical forest can be seen to create hidden spaces on terraces behind falling/tumbling walls of foliage. This may well represent a greater risk of fire initiation and spread.
Longer term considerations	Green, brown, and blue roof technologies BRE Global is aware inverted roof technologies with stone or paving slabs as the loading layer, achieving BS 476-3: 2012 *Fire tests on building materials and structures - Classification and method of test for external fire exposure to roofs* [61] designation. However, during testing some modern materials exhibit considerable vertical flaming which could represent a potential route for fire spread from roof or sub-deck construction into flats via open windows and doors. If an inverted roof is placed directly under decking, the flame spread could be different. ***Consideration of the following:*** ➢ The effect of roofing systems in combination with both timber and imitation/composite timber-effect decking. ➢ The smoke production where the system may be used up against an external wall adjacent to accommodation. ➢ Whether the insulation material would burn vigorously rather than only melting if the radiation exceeds 12 kW/m^2. ➢ The flame height during a fire test needs to be accounted for in some way. Modern building shapes/facades and living gardens ***Research is recommended to consider:*** ➢ Building shape. BRE Global is unaware of any current experimental research considering the effect of the shape of modern façades on fire spread. ➢ Façade composition. ➢ Interaction with living gardens. ➢ The part wind plays in spreading fire. Three modern technologies ***Research and consideration of the fire characteristics of:***

	➢ Sandwich plate systems (SPS) used as structural floors where the system incorporates an organic filler core. The fire performance properties of the material and flooring systems are unknown. ➢ Man-made slates (incorporating resin binders). BRE Global is aware of man-made slates used on a roof of a building which had a fire event and the resin of the tile flowed and facilitated rapid fire spread during that fire event ➢ Composite fencing and decking. BRE Global is aware of the use of composite imitation timber fencing and decking in fire events in North West England. The fires were characterised by very dense black smoke and rapid fire spread.

What is driving the need to consider this?

Green walls and green roofs

Green roofs are becoming increasingly popular.

Planning Authorities are keen to make a link between landscaping and green walls, with the latter being an extension of 'landscaped areas'. Green walls can help schemes achieve BREEAM 'Excellent'. A 12 storey office scheme in Manchester due to complete in 2023 will feature 4,300m^2 of living wall. A shopping centre in Ashford used a green wall 'theme' for the development. The walls are very popular with Planning Authorities as they trap particulates and are a CO_2 'sink'.

Use of inverted roofs

Modern designs needing to secure sustainable design 'credits,' will invariably have green, brown or (underlying blue roof) technologies.

Green roofs have live plants (varieties of sedum) in growing medium (soil) and will often form part of an accessible terrace/communal garden. Green roofs can integrate with decking, paving and garden furniture (benches).

Brown roofs are more focussed on providing bio-diversity for insects and birds and may include rope, logs ponds etc. Brown roofs are less likely to be public spaces and are quiet, rugged, nature-friendly spaces for self-sustaining habitats. Brown roof plants that can endure long dry periods are often selected (brackens). Little or no irrigation is required.

Blue roofs can be provided under either green or brown roofs. Blue roof technology replaces underground storm water attenuation tanks, which were formerly fitted with hydro-brake (vortex flow) controls, and provides the irrigation for green roofs. The common theme with blue roof technology is the use of thick layers 300mm to 500mm of thermoset insulation. Blue roofs also incorporate inspection boxes which may be plastic and on account of their size, they could not be subjected to testing in accordance with BS 476-3:2012.

Building shape

Building shapes have become less 'box-like' and less 'vertical'. Facades are now multi-faceted. Tall buildings particularly, tend to be the canvass for exploring modern building shape(s), façade composition(s) and integration with living gardens.

Building shape. Typical fire breakout from a post-flashover fire on exiting a window, set in a vertical façade, is well studied and observed. Fire breakout from a window/door in modern shaped facades is not so well studied because façade shapes are almost limitless. Façade shape may influence the Coanda effect. The Coanda effect is characterised by a flame front seemingly 'adhering' to a surface and this is a mechanism of fire spread. The effect of wind would complicate fire spread. Modern building facades can also step, stagger and twist as well as curve.

Façade composition. The effect of fire on multi-faceted facades i.e. facades which have spaces between elements or spaces between overlapping elements ('articulated' façades) and/or with air voids and air channels will behave differently to monolithic materials (brick or sheet panelling).

Interaction with living gardens. The greenification of buildings has resulted in a desire for architecture incorporating terraces, balconies (including inset balconies) and winter gardens with considerable plant life. At one extreme is the vertical forest concept [62]. The vertical forest concept, attributed to Stefano Boeri, is that the building becomes a large living breathing air filter. Reference 60 shows a landmark building in Milan (designed by Staefano Boeriarchitetti, completed in 2014) and Reference 62 shows the first known vertical forest in West Bromwich. Other vertical forest buildings have been built in Utrecht, Lausanne and Nanjing, and others are planned in Paris, Tirana and Shanghai.

Green walls and green floors/decking and grass (including artificial) all represent new fire risk considerations for tall modern building design.

Assembly buildings

The material of choice seems to be highly-insulated, metal-skinned external wall panel systems. Such wall systems are seen as an effective way of thermally insulating and getting a good 'look' for the building quickly. Also, panelised walls (offsite constructed walls) have become a popular choice.

Implications if AD B does not change

Green walls and inverted roofs

The risks of fire spread, either by the foliage or the carrier pots, could be researched on intermediate-scale fire test rigs. From this research, guidance could be provided in AD B as to the risks associated with vertical forest type designs and mitigation.

Use of inverted roofs

Where these roof technologies integrate with landscaping and green roofs, it is reasonably foreseeable that at some point in the future there will be a fire(s) involving communal decking or communal garden furniture (or a communal rooftop barbecue), which spreads to the insulation of an inverted roof. Fire spread may be ‘fanned’ by wind at roof garden level.

It is noted that during BS 476-3:2012 testing, inverted roofs are subjected to a radiation intensity that may be exceeded in the event of a real fire in combination with timber or composite timber decking.

Building shape and façade composition

There is little known about the influence of building shape and façade composition where the building leans, twists, steps, staggers and curves and little is known of the effect of fire spread over façade material which is comprised of multiple scale-like or tile-like or close fitting/interlocking elements where the facets include air voids and air channels.
For AD B to remain current, a better understanding of these effects in combination should be considered and explored.

Three materials are identified by BRE Global that would benefit from experimental work to characterise their reaction to and performance in fire, both in isolation, and as part of system build-ups:

a) Sandwich plate systems. This technology incorporates an organic filler core of unknown fire performance used as a structural floor in large buildings.
b) Man-made roof slates which have a resin binder to hold the dust together.
c) Composite imitation timber fencing and decking material. This is because the material could be used on buildings e.g. roof terraces or it could be located close to means of escape routes.

Theme 10 Co-living

Note that many of the considerations relating to Co-living are addressed in other themes above and below, but some are worth repeating here and some may have a greater relevance for Co-living.

Short term consideration	None identified
Medium term consideration	Theme 2 *Ventilation/smoke control in modern buildings* considerations apply to *Co-living*.
Longer term considerations	Consideration of provisions for fire safety in co-living buildings ***Considerations may include:*** ➢ The use of ancillary accommodation and whether additional guidance on separation of escape routes and compartmentation remains appropriate. ➢ Means of warning and escape. ➢ Escape stair widths. ➢ Maximum height of buildings. ➢ Defend in place or simultaneous or phased evacuation. ➢ The role of management and evacuation lifts. ➢ The physiological demands placed on the Fire and Rescue Service when evacuating floors, firefighting and rescuing. See Theme 1 *Tall building and single stairs*. ➢ Redundancy and the number of firefighting lifts.

What is driving the need to consider this?

Alternative housing model

Co-living has grown out of necessity, for young people primarily (but not exclusively) who have found it impossible to get on the housing ladder. Co-living is marketed as being inextricably linked with lifestyle and social networking. Co-living appeals to the 20 to 30 year old sector where the resident is happy to work in and move around city(ies) as job opportunities arise and social cohorts move on.

Co-living could be described as a very modern hybrid of HMO/student 'halls' living. Co-living introduces much more complexity when complying with Schedule 1 requirements B1 to B5 as floorplates are not mere repeats, all the way up the building, amenity spaces change, and the floor layouts vary. Co-living may incorporate furnished communal lounge(s), large kitchen(s), lecture/presentation areas, cinema rooms, fitted out work hubs, gymnasia, conference areas/viewing galleries, terraces/rooftop gardens.

Some articles researched suggest that many co-living residents have a keen interest in the green credentials of their home and wish to live in a building that was constructed in an energy efficient way, whether that is volumetric modular or a modular wall panel system or other Modern Methods of Construction. In a Savills report (2020) [63] a claim is made by an offsite wall panel manufacturer that the homes they are building use

> *"[…] 39% less CO_2 during construction than traditional construction and are expected to save 167 tonnes of carbon over 25 years of use."*

Co-living developments are likely to continue to embrace modern construction methods and move further away from heavy-side construction. If the co-living sector can overcome its detractors who say it is about minimising space and maximising density and revenue [64] and that it does not suit young families (and its apparent appeal to young professionals), then the boom may continue.

Taller buildings and greater use of ancillary spaces

In and around the 2000s, residential blocks were a) not noticeably constructed as towers, developments tended to be of medium and high rise (tall) but not very tall or ultra-tall and not in the

towers seen today and b) floor plates were mostly repeat from first (if not ground) floor to the top storey.

A pair of (modular) co-living towers under construction in South London in 2022 will result in accommodation over 47 levels including the following: levels -2 to -1; basement car park, stores and plant etc, level 00 to level 2; dining rooms, studios, Deli and café, podcast studio, collaborative studios, laundry rooms, shared workspace, classrooms and gymnasiums; levels 3 to level 45; apartments, level 46; cinema, formal reception, lounge, library, banqueting hall, kitchen and level 47; rooftop (garden) amenity space.
See [65] a planning committee report which acknowledges fire safety is a building regulations issue.

Town and Country Planning requirements
City plans use language like 'inclusion', 'meeting' and 'outdoor spaces' that facilitate 'social interaction'. This modern drive for communal assembly spaces, at different levels in blocks of flats, is triggering the need to consider the role of management, separate fire detection/alarm, mixed policies on means of escape (stay put and or simultaneous evacuation in the same building) compartmentation, smoke control/management and Fire and Rescue Service intervention.

Disabled people
The role of management and their plans for evacuation procedures is now a planning consideration. Carry down devices that rely on manual handling of disabled people are not appropriate for dignity and independence under current planning considerations. There is confusion between designers, Building Control and Fire and Rescue Services as to which guide to follow and how to manage/integrate evacuation lifts that enable a disabled person to make their own decision to leave a residential building in a dignified manner if they so wish.

Implications if AD B does not change

Co-living new challenges
The form of tenure represents a departure from the design norms of 'residential' accommodation of the pre and early 2000's. In residential buildings of the early 2000s, the use of ancillary space was not at the scale it is with co-living accommodation of the 2020s. Floor plates of residential buildings of the early 2000's repeated. They repeated, if not from ground floor, then certainly first floor to the top storey.

By way of example [65]: A pair of (modular) co-living towers under construction in South London in 2022 will result in accommodation over 47 levels in one tower and 33 levels in another. The accommodation of the taller tower includes the following: levels -2 to -1; basement car park, stores, and plant rooms etc., level 00 to level 2; dining rooms, studios, deli and café, podcast studio, collaborative studios, laundry rooms, shared workspace, classrooms and gymnasiums, level 3 to level 45; apartments, level 46; cinema, formal reception, lounge, library, banqueting hall, kitchen and level 47; rooftop (garden) amenity space.

Others deciding fire safety compliance
In the Planning committee report for the 47-storey tower [65] it states that the devolved regional governance body (Greater London Authority) advised the borough's planning service that the fire statement was acceptable. Approvals at planning stage may be harder to 'undo' when the application progresses to detailed consideration by the Building Control Body/Building Safety Regulator in due course. These schemes look set to remain 'common' and if not at 40 storeys tall they will likely be 'common' at up to 40 storeys. They could of course be taller.

Other challenges of co-living
The rooms in co-living towers are invariably open plan with the only cellular space tending to be adjacent to the entrance door (the shower/WC facility).

In BRE Global's view there is a correlation between the layouts shown in Diagram 3.2 and Diagram 3.3 (albeit to a lesser extent in diagram 3.3) in AD B Volume 1 and 'layers' of fire safety provision supporting a defend in place fire strategy.

It is clear and obvious that flat layouts with cellular rooms rather than an open-plan arrangements afford the occupant (who may be unable to escape their flat, on account of the common corridor being impassable) the *opportunity* to move to a room away from the flat front door, if the flat front door begins to fail and smoke enters the flat.

Being able to retreat to another room (possibly with a window) would help to 'buy time' for firefighters to locate/rescue an occupant.

It is noted that one London Local Authority adopted a new policy (July 2017) of replacing flat front doors in buildings of six or more storeys with FD 60(s) doorsets [66]. This policy is seen as providing an additional layer of fire safety provision and the policy applies to all flats open plan and cellular.

If simultaneous evacuation or progressive evacuation was the strategy for co-living towers, one would need to consider the means of detecting fire and raising an alarm, the width of stairs and whether a descent of very many floors is possible for all residents.

Evacuation of fire floors

In BRE Global's experience, 'traditional' residential buildings in which the design incorporates a 30m 'leg' may result in a density of between eight to twelve flats per leg.

In co-living accommodation, the units tend to be narrower than the 'traditional' flat. Therefore, it is reasonably foreseeable that co-living will result in a greater 'density' of flats than 'traditional' design. The actual occupancy numbers per floor may be broadly comparable.

If the Fire and Rescue Service determine they need to clear two floors (two 30m legs) in a 'general needs' block this may equate to the need to force entry to say 20 flats and for the co-living block 32 flats. Every scheme will be different but, as a general approximation it is reasonably foreseeable that in co-living blocks there is a need for more forced entries to clear floors.

Mixing and matching guidance

AD B guidance paragraph 0.9 advises against mixing and matching guidance documents, where alternative publications are adopted. The exception to this is where the AD B specifically suggests using alternative guidance for a particular aspect of design. Designers of single stair buildings with extended corridors (up to 30m long) typically use AD B for guidance but 'change track' to use the SCA and CFD modelling 'route' before reverting to AD B to complete other aspects of the design. AD B could consider if the SCA guides or other, should be endorsed.

Single direction travel in common corridors in blocks of flats

The guidance in AD B is that maximum single direction horizontal travel is 7.5m (Diagram 3.7). Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 [26] to protect the stair, lobby, and lifts.

Current designs, approved by the authority having jurisdiction (AHJ) are for distances up to 30m and mechanical smoke shaft ventilation systems. Designers submit a) designs in accordance with the Smoke Control Association guide (SCA) guide: *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes) 2020* and b) computational fluid dynamic (CFD) modelling. There are differences of interpretation between Fire and Rescue Services, Authorities Having Jurisdiction and Fire Engineers justifying designs as to what is 'the' correct way to demonstrate compliance.

Ongoing concerns
It is not known how these smoke control systems work in practice, under different conditions e.g. wind pressure conditions in tall, very tall, and ultra-tall buildings when the front door of the flat (which may be very close/opposite the stair) is opened during escape, or firefighting mode.

Dignified escape
Draft BS 9991 Section 3.62 AD B states *"...all residents [should be] free to leave their flats if they so wish"* and Section 7.6.1 states "*All building users should be able to evacuate from a building as independently as possible"* and Section 54 states "*An evacuation plan should not rely on the assistance of the Fire and Rescue Service*". The Draft BS guidance, if it is adopted, is that evacuation lifts can be automatic with pre-programmed information or 'driver-assisted'. The guidance considers management obligations during a fire.

The current guidance in AD B is 'out of step' with current designs of co-living accommodation.

Theme 11 Multiple and different uses

Note that many of the considerations relating to Multiple and different uses are addressed in other themes above and below, but some are worth repeating here and some may have a greater relevance for Multiple and different uses.

Short term consideration	None identified
Medium term consideration	Theme 2 *Ventilation/smoke control in modern buildings* considerations apply equally to *Multiple and different uses*.
Longer term considerations	Compartmentation (the role of transfer slabs) and suppression ***Consideration should be given to:*** ➢ The status of transfer slabs and what they mean for AD B compliance as this is not well understood. Mixed use buildings often have a transfer slab at an upper floor to create separated parts (but these are not given the same designation as 'separated part' that is defined in Appendix A of AD B Volume 1 and 2). ➢ Suppression systems in mixed-use buildings. AD B recommends that in a building with residential accommodation above 11m a sprinkler system to BS 9251:2014 *Fire sprinkler systems for domestic and residential occupancies* [67] should be installed in the flats. If the building is in multiple or mixed-use and if the building has a transfer slab at first or second floor it is common for the designers to consider if the BS 9251 system can be extended down to the back of house and commercial spaces at ground and first floors. *Note This is to avoid the need to design a separate system to BS EN 12845:2015 for only the ground and first floors.* ➢ How requirement S: *Infrastructure for charging electric vehicles* influences the need to include a system to BS EN 12845:2015 *Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance* [68] could be considered. Additional consideration of Theme 1 *Tall building and single stairs* and earlier BDAG work (2004) ***Consideration and review should be given to:*** ➢ The added physiological burden on firefighters having to travel horizontally at transfer slab level to progress from one firefighting shaft to another.

	➢ The modern design trend to locate the principal stair core centrally within a building, some distance from the point of access to the building and whether guidance diagrams in AD B would be of use in clarifying the location of principal stairs and the role of exit passageways. ➢ The guidance in BS 9990:2015 *Non automatic fire-fighting systems in buildings. Code of practice* [69] which states that the maximum horizontal distance of a fire main before it turns to rise vertically is 18m. ➢ The physiological burden on firefighters having to travel two horizontal distances from: a) the pump appliance to the first lift and b) the first lift to main lift serving a tower (at transfer slab level). If either lift is out of service at the time of a fire event, the burden on firefighters could be considerable. Management and facilitation of dignified, independent evacuation ***Consideration to be given to:*** ➢ The draft BS 9991:2021 and the various sections within it which provide a far greater emphasis and support of freedom to evacuate independently and in accordance with a management plan. See: S 3.62 Stay put strategy (*footnote*) *[…] all residents are always free to leave their flats if they wish to do so (e.g. if they feel unsafe) […]"* 7.6.1 Warning and escape: General: *"All building users should be able to evacuate from a building as independently as possible."* S 54 Evacuation of disabled occupants or occupants who require assistance to escape: *"An evacuation plan should not rely on the assistance of the fire and rescue service.*" Multiple (mixed) use buildings with a single stair ***Consideration to be given to:*** ➢ The draft BS 9991:2021 guidance which would, if implemented, preclude the use of single stair designs in buildings with a floor at 18m or more above ground level except under stringent conditions. One of these conditions would be that design solutions (using natural ventilation and mechanical shaft ventilation) referenced in *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes)* (2020) would no longer be acceptable.
What is driving the need to consider this?	
Complexity of buildings The drivers given in Theme 2 *Ventilation/smoke control* in modern buildings on extended travel in corridors and for smoke control in basement car parks applies equally to this Theme 11 *Multiple and different uses*, as multiple use buildings tend to be tall or wide or both. Maximising the use of a plot Mixed use buildings are looked on favourably by Town Planning. Whilst mixed use buildings were once limited to residential use above shops, they now have the potential to deliver much more community 'gain' [70]. To get the full gain from mixed and multiple use developments (in city centres, on congested sites) buildings have become increasingly taller, vertical city 'like'. Alternatively, mixed and multiple use developments can also be complex and horizontal rather than complex and vertical. A town centre redevelopment with a mix of retail, assembly, offices, open spaces and residential is a complex multiple use building(s). Defining the scope of multiple use buildings in AD B could help set sensible signposting as to when to depart from AD B guidance and	

when to adopt other guidance e.g. BS 9999:2017 *Fire safety in the design, management and use of buildings* [66].

Extended corridors serving flats on upper floors
The provision of a second stair in a mixed-use building has similar implications to those described in single stair buildings in terms of layout; with a commensurate reduction in the number of apartments that can be built at upper level.

Single direction access corridors in mixed use buildings can still be up to 30m long (each leg) see Theme 2 *Ventilation/smoke control in modern buildings*.

The guidance in AD B is that maximum single direction horizontal travel is 7.5m (Diagram 3.7).
In BRE Global's view, designs for single direction horizontal travel up to 30m to a single common stair, are now common. BRE Global is also aware of this 'maximum' distance of 30m (stipulated in the SCA guide) being challenged (on one occasion) to 40m.

Smoke control in corridors on upper floors
Designers frequently follow the Smoke Control Association *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (2020) and Guidance on CFD Analysis for Smoke Control Design in Buildings (2021)*

Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including non-combustible construction and a BS EN 12101-6:2005 pressure differential system to protect the stair, lobby, and lifts.

Implications if AD B does not change

The risk to firefighters and fire rescue operations
The physiological limitations of firefighters may be being pushed beyond acceptable limits where there are additional 'stressors'. One such modern additional 'stressor' is the requirement for fire-fighters to have to travel between stairs where the building incorporates a transfer slab. This is particularly the case where the principal stair is an inboard stair, located deep within the site, rather than close to an external wall of a building.

In tall, single stair and mixed-use buildings, the provision of one firefighting lift becomes a critical issue. If the lift is found not to work during a fire event, firefighters may have to operate beyond safe capabilities and run the risk of injury to themselves.

The means of escape from multiple use buildings can be very complex. Some buildings on congested city sites may have multiple exit routes from different floors, serving different 'wings'. Exit points may be to ground or podium level on different streets, especially if the building is located on a steeply sloping site. Some additional guidance for multiple use buildings on complex and steeply sloping sites would be of assistance.

Sprinklers and transfer slabs
There is uncertainty in industry as to the suitability of extending residential sprinklers complying with BS 9251:2014 down to cover retail and back of house areas and when it is definitely inappropriate. The introduction of Part S: *Infrastructure for charging electric vehicles* adds another level of complexity. The status of transfer slabs and creating separated parts is also not widely understood.

Single direction travel in common corridors serving residential accommodation in mixed-use buildings
The guidance in AD B is that maximum single direction horizontal travel is 7.5m (Diagram 3.7).
Draft BS 9991:2021 guidance, if adopted, is for two stairs in buildings with a floor at 18m or more above ground level unless other fire safety conditions are met, including (but not limited to) a pressure differential system to BS EN 12101-6:2005 [26] to protect the stair, lobby, and lifts.

Current designs, approved by the Authority Having Jurisdiction are for distances up to 30m and mechanical smoke shaft ventilation systems. Designers submit a) designs in accordance with the Smoke Control Association guide: *Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes)* (2020) and b) Computational Fluid Dynamic (CFD) modelling. There are differences of interpretation between Fire and Rescue Services, Authorities Having Jurisdiction and Fire Engineers (justifying designs) as to what is 'the' correct way to demonstrate compliance.

Mixing and matching guidance
AD B guidance paragraph 0.9 advises against mixing and matching guidance documents, where alternative publications are adopted. The exception to this is where the AD B specifically suggests using alternative guidance for a particular aspect of design. Designers of single stair buildings with extended corridors (up to 30m long) typically use AD B for guidance but 'change track' to use the SCA and CFD modelling 'route' before reverting to AD B to complete other aspects of the design. AD B could consider if the SCA guides or other, should be endorsed.

Ongoing concerns
It is not known how these smoke control systems work in practice, under different conditions e.g. wind pressure conditions in tall, very tall, and ultra-tall buildings when the door of the flat (which may be very close/opposite the stair) is opened during escape, or firefighting mode.

Dignified escape
Draft BS 9991 (Section 3.62) AD B states *"...all residents [should be] free to leave their flats if they so wish"* and Section 7.6.1 states "*All building users should be able to evacuate from a building as independently as possible"* and Section 54 states "*An evacuation plan should not rely on the assistance of the Fire and Rescue Service*". The Draft BS 9991 guidance, if implemented, is that evacuation lifts can be automatic with pre-programmed information or 'driver-assisted' and it also considers management obligations during a fire.

The current guidance in AD B is 'out of step' with current design of tall and multiple/mixed-use buildings.

Theme 12 Multi-functional uses: Alternative and flexible

Short term consideration	AD B could draw attention to the need to be accurate when predicting occupancy levels in a building.
Medium term consideration	Clarity on purpose groups and HMO guidance ***Considerations may include:*** ➢ Provision of guidance on houses in multiple occupation. ➢ Review of Purpose groups and triggers under Building Regulation 5 *Meaning of material change of use.* ➢ Provision of guidance on the different forms of residential tenure and holiday type tenure (Aparthotels, Airbnb, bed and breakfast accommodation, short term lets). ➢ Student accommodation that during holiday periods is marketed as hotel use and whether a change of use has occurred, triggering considerations under Building Regulation 6 *Requirements relating to material change of use*.
Longer term considerations	None identified

What is driving the need to consider this?

Lack of guidance on HMOs

Given the high price of rental in the private sector in inner cities, the most economical solution for a person wanting to live in a traditional built semi-detached property is to rent a room in an HMO rather than renting a self-contained studio flat [71]. The corollary to this is, the sector offering the cheapest accommodation is the sector most in need of being regulated and requiring the greatest 'control' under building regulations.

It is increasingly common for a former dwelling (two or three storeys in height) to be extended and converted to create both an HMO (for more than six persons living as a household) and studio flats. There is no current practical guidance for complying with schedule 1 relevant requirements B1 to B5 for HMOs. However, it was felt by practitioners that further guidance was needed for HMOs where they had more than six residents not living as a single household.

Guidance was provided in AD B 2002 (paragraphs 2.3 and 3.5) and in AD B (2006) but only for up to six persons. Guidance in AD B (2019) has been removed and there is no reference in either Volume 1 or Volume 2 to HMOs. This lack of guidance is seen by practitioners as a retrograde step that places persons at risk.

Purpose groups

There is uncertainty over the maintained use of some of the definitions of the various purpose groups which have not changed much since the 2000 edition. In over twenty years, the purpose groups should have been reviewed.

There is uncertainty as to what control and standards should apply to blocks of flats which were originally designed and intended for 'general needs' housing with a 'stay put' fire strategy, where some flats over time are being rented out as Airbnb, or they are marketed as a flat in an apart-hotel or a short term holiday let. Where such a change occurs, does a material change of use under Regulation 5(c) or 5(h) occur?

There is concern that halls of residence change to hotel use during holiday periods and that this is not captured by an application for a Material Change of Use. This is not an AD B question but in the same way Regulation 7(2) is picked up in B4, perhaps AD B could provide clear commentary on expectations when such a change of use occurs.

Implications if AD B does not change

The need to provide guidance on HMOs

The HMO sector is seen as one where regulatory control is needed to protect the most vulnerable in society. The removal of all of the guidance on HMOs is seen as a mistake. When AD B falls silent on HMOs, it may in extreme cases leave the most vulnerable to remain the most vulnerable.

Purpose groups

As soon as 'general needs' flats start to be marketed as Airbnb and aparthotels, there is a risk that the fire strategy becomes confused. For example, a tourist would expect an alarm to sound in a 'hotel' corridor if there was a fire. An increased level of fire risk is introduced by allowing 'general needs' flats to become a hotel. Similarly, when halls of residence become a summer hotel compliance with building regulations should be reviewed under Building Regulation 5(c) material change of use to hotel.

This feeds into a wider debate about purpose groups which have remained largely the same in AD B since at least 2000.

Theme 13 Competing regimes

Short term consideration	Compliance with optional requirements M4(3)(2)(a) adaptable housing and M4(3)(2)(b) fully compliant wheelchair accessible housing at completion ***Review:*** ➢ AD B and AD M guidance so that each takes into account the others recommendations and AD B is not out of step with ADM. The requirement under AD M allows accommodation to be wheelchair adaptable or wheelchair accessible and introduces a risk by the flat entrance door.
Medium term consideration	Iterative review of Approved Documents ***Review:*** The following Approved Documents have guidance which on their own or taken with other Approved Documents have the ability to 'compete against' AD B: Fire Safety. F: Ventilation [72] L: Conservation of fuel and power [73] M: Access to and use of buildings [74] O: Overheating [11] Q: Security [75] S: Infrastructure for charging electric vehicles [18] See suggestions under Theme 1, 4 and 6 for Part L and Part O and Part S. The guidance contained in all Approved Documents can be reviewed iteratively and adjustments to AD B guidance made where needed. Adjustment to AD B guidance AD M paragraph 3.25 and Diagram 3.6 encourages the location of a cupboard adjacent to the flat entrance door. The location and fire protection measures for such cupboards (recesses) are important considerations for AD B.
Longer term considerations	None identified

What is driving the need to consider this?

Approved Document M: Access and use of buildings

AD M guidance and AD B guidance should be considered to ensure they do not compete as internal halls in flats should be fire sterile. AD M gives guidance on complying with optional requirements M4(3)(2)(a) and M4(3)(2)(b) both of which require a space close (without exact definition of 'close') to the front door of a flat to be the location for wheelchair storage (for two chairs, one for internal and one for external use) and an electric charging point. Requirement M4(3)(2)(a) being the adaptable option, suggests that until wheelchairs are required the space (or 'recess', as shown in Diagram 3.6) can be a cupboard.

Cupboards immediately adjacent to front doors

BRE Global investigated a fire damaged building in 2021, where a fire occurred in a cupboard within a flat's entrance hall. In the early stages of the fire, when the resident first attempted to fight it, contents fell to the hall floor. The resident stumbled across some of these items inadvertently kicking them towards the flat front door, where they became wedged over the threshold thereby preventing the door from self-closing. The resident tried unsuccessfully to clear the obstruction on account of the growing fire. The Fire and Rescue Service needed to rescue occupants from neighbouring flats.

The location of such cupboards is an important consideration for both AD M and AD B.

Other approved documents
Other schedule 1 relevant requirements can actually be a 'competing regimes' in the sense that what they *introduce or* require could be in conflict with AD B. Schedule 1 relevant requirements F: *Ventilation* and L: *Conservation of fuel and power* as well as requirement O: *Overheating*, Q: *Security* and S: *Infrastructure* for charging electric vehicles could all be reviewed to determine points requiring clarification.

Policy plans under Planning
Some limited but significant Town Planning guidance is now taking the lead ahead of technical guidance in AD B, see the London Policy Plan (Policy D5:B5). Such guidance can be seen as another 'competing regime'.
Planning departments will require: a) a fire safety statement b) emergency evacuation lifts and management undertakings in regard to managed emergency evacuations see Draft BS 81-76 *Safety rules for the construction and installation of lifts. Particular applications for passengers and goods passenger lifts* [76] c) dignified and independent escape d) no reference to use of manual carry down chairs, as these are no longer acceptable.

These planning initiatives could all be reviewed to improve AD B guidance.

Implications if AD B does not change

Part M guidance
AD B needs to be cognisant of what AD M: *Access to and use of buildings* 2015 requires for wheelchair storage and charging in entrance halls inside flats, to comply with optional requirements.

There is also a consideration regarding the safe location of this cupboard (see above).

In M4(3)(2)(a) adaptable accommodation, cupboards with charging points may well will be used to charge battery powered consumer goods. Modern consumer goods are often found to be powered by lithium-ion batteries. These batteries, when they fail, can do so in a runaway reaction, which can lead to potentially explosive (locally intense) fires.

In M4(3)(2)(b) accessible accommodation, the recess (suggested in Diagram 3.6 in AD M) for the indoor wheelchair and the outside mobility scooter has a dedicated and local charging point.

Consideration could be given to where this recessed space should be located within the hall (see above).
Also, consideration could be given to whether the chair/mobility scooter must always be in a fire-rated cupboard.
Also, consideration could be given to localised fire detection, suppression and/or other mitigation like greater periods of fire resistance [77].

Scale of the issue
Planning Authorities expect designs to facilitate wheelchair users being able to access flats at differing heights and on different elevations of a building. A Planning Authority will require 10% of flats in a block, being built for social housing, to be M4(3)(2)(b) wheelchair accessible compliant. Where a development is for private sale and rental, the Planning Authority will require the 10% allocation to be a blend of M4(3)(2)(a) wheelchair adaptable and M4(3)(2)(b) wheelchair accessible compliant flats.

Other guidance
AD B runs the risk of being 'out of step' with aspects of Approved Document guidance in support of Schedule 1 relevant requirements F: *Ventilation* and L: *Conservation of fuel and power* as well as requirement O: *Overheating*, and S: *Infrastructure for charging electric vehicles*. Revisions to AD B can consider all Approved Document guidance.

Theme 14 Checking compliance in different ways: Digital and Artificial Intelligence

Short term consideration	<u>An interim position, whilst long term consideration is given to the wider role of digital and artificial intelligence</u> ***Clarification of:*** ➢ The wording in AD B that manufacturers must not be able to withhold parts of test certificates. ➢ The wording in AD B that full certificates and fields of application should be provided on each and every occasion. ➢ How test certificates must (and must not) be interpreted.
Medium term consideration	None identified
Longer term considerations	<u>The potential role for compliance checking, using Digital and/or Artificial Intelligence, of components and systems, using a database of test evidence and certification</u> ***Consideration of:*** ➢ A digital database of test results of components and system(s). ➢ How test evidence would be uploaded to such a digital database and how this would link into the work of Construction Products Regulator. ➢ The role of Artificial Intelligence in checking individual components of a 'system' have been installed on site and that design, installation verification and commissioning certification of the system are correctly competed. ➢ The role of Artificial Intelligence in determining when products/components used in isolation can be allowed and when they must be used as part of a system. ➢ Digital and/or Artificial Intelligence blocking an 'alternative approach', allowed for under paragraph 0.9 (AD B Volumes 1 and 2) in those situations where compliance is mandatory e.g. in relation to B4 and Regulation 7.2. ➢ Similar blocking of 'alternative approaches' if and when other parts of requirement B1 to B5 become mandatory. In addition to this, consideration could be given to how industry might validate different and bespoke software 'packages' used for CFD and other speciality analyses.

What is driving the need to consider this?

<u>Use of third party assurance</u>
The use of test certificates is not properly understood. Fields of application and even extended application rules are not understood and they should be provided electronically, be freely available and not edited.
It is possible that artificial intelligence could pick up on errors in specifying one material with an incompatible one, but to do this artificial intelligence would need a 'bank of system tests' to draw on to determine that material X has not been tested in conjunction with material Y [78]. The intent is noble, but the reality might be some way off.

Test certificates should be clear whether they are component based or system based and in each instance what their field of application is.

<u>Maintenance of 'the golden thread' of compliance</u>
The Hackitt Report [79] raised the need for there to be a 'golden thread', from design through procurement to installation and commissioning. Artificial intelligence or Digital compliance checking, at each stage, could play a role in this. The role of Building Information Modelling is already established and could be the platform for future digital checking. By way of example, an 'approved' dry riser design may require the following components, a 150mm diameter riser pipe (not 100mm diameter) and double 'Y' outlets (not single outlets) at each floor.

AI or Digital checking could be of use at procurement stage, where only components with a correct quick response or bar code (QRC or Bar code) can be procured. Similarly, at goods receipt (to site) stage and commissioning and verification stage, if the component(s) are not scanned in and or if the QRC or Bar code does not match the QRC or Bar code entered at design and then procurement stage, the 'system' should show red (in error). The Authority Having Jurisdiction, the fire authority and designer could all be notified of a 'system' going red. Once red, the system would need a formal resetting.

Can other forms of modelling demonstrate compliance?
The trend for open plan layouts remains. If following the 'linear route' to compliance (as shown in Diagram 3.3) the provisions of AD B are that the kitchen would be located as remote from the flat front door as possible. When considering an engineered solution allowing the kitchen to be located adjacent (in very close proximity) to the flat entrance door, AD B could perhaps provide acceptable tenability criteria or endorse certain validated software and perhaps input parameters to use.

Guidance is provided in the draft BS 9991:2021, on the distance between the hob and any 'obstructions' (on the principal escape route) and the front door. Consideration of the provisions in the draft BS 9991:2021 might inform any revised guidance in AD B.

Implications if AD B does not change

Materials and products may continue to be mis specified and therefore be non-compliant but go unnoticed.

Should Draft BS 9991 2021 guidance be referenced or can modelling still have a role when considering say an open-plan flat layout results in a cooker hob being close to the front door of a flat?

Report Ends