DETR Framework
Project Report :
Investigation of real fires

Project report number 76572

Prepared for :
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Safety and Health in Buildings

Investigation of real fires

cc1465a

Interim Report

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Executive Summary

DETR Contract cc1465a 'Investigation of Real Fires' runs from April 1997 to March 2001 and was set up under the Safety and Health in Buildings Business Plan. This interim report summarises the fires investigated during the period April 1999 to March 2000 on behalf of the Department to provide timely and relevant information arising from fire incidents as they occur. Information is gathered from both on site visits and from a network of other fire investigators in the fire service, police and specialist consultancies.

This report is the fourth of five annual summaries, all of which have been produced *post hoc* in order to confirm findings particularly if the incident is subject to court proceedings.

The information gathered is used to inform the guidance published in Approved Document B for England and Wales with minor input to the regulatory documents in Scotland and Northern Ireland. This guidance must offer effective solutions to real fire problems which can only be done by examining information from real fires. Feedback is also provided where guidance has been successful and guidance has resulted in the minimising of fire spread and threat to life.

The latest edition of the Approved Document includes new topics such as sandwich panels that has arisen from concerns about the use of composite panels with combustible cores. This project has been able to provide information relevant to that issue.

The project is open-ended in that it reacts to real events not planned ones. One result of the network has been the ability to highlight problems at an early stage. It is the aim of this project to draw the Department's attention to potential life safety issues rather than explain them after the event. In this way policy issues are raised at an early stage.

Contents

1. INTRODUCTION

The project 'Investigation of real fires' was first set up in its current form in 1989. BRE has a long history of reporting details of real fires to government both for regulatory purposes and to inform choices about other research topics. Throughout the work FRS staff have been reporting on the fire performance of buildings and the materials from which they are made as well as the behaviour of occupants including emergency service personnel. The feedback is also provided to other DETR-funded topics of research and is used to identify new areas for study.

The work on using real fire data in mathematical models was interrupted by changes in staff and will be reported on separately. It is envisaged that a school fire and a warehouse fire will be modelled both for fire growth and the behaviour of the people involved.

Fires investigated have included:

a deliberate fire in a bedroom/bathroom pod forming part of a large hotel extension during the final stages of construction

inappropriate use of rigid foamed plastic insulation as a ceiling lining on the ground floor of a two storey dwelling;

fatal fire following poor choice of materials in tower block refurbishment;

cable fire in an office block;

spread of fire between cars in multi-storey car parks and elsewhere which is not the expected fire behaviour;

large cash and carry warehouse where all the sprinklers actuated;

feedback on fire strategy for a well-known department store.

Problems with refurbishment schemes that only become apparent during a fire were highlighted in the investigation of a fatal fire in Scotland where the role of the GRP cladding came under close scrutiny. This fire triggered a special hearing of the Select Committee on the Environment where the topic of claddings was discussed and reported on. Other problems such as the use of spare bits of timber from construction sites to add bracing to the A-frames of an add-on roof resulted in the blocking of access to the extract fans for a block of flats.

2. DESCRIPTION OF THE PROJECT

As soon as information about a fire is available from news items, press reports or from brigades, a view is taken as to any possible implications for Building Regulations. This may be because the fire illustrates concerns already expressed as with large single storey buildings or may highlight an unusual fire behaviour as in a very few car parks in the period. If a visit is envisaged the Department's advice is sought as to whether attendance or a request for information will be made. In either case a one page summary with clear implications is prepared and sent to the client within 48 hours of finding out about the fire. If the fire receives a high level of press and media coverage it is investigated as a way of keeping the Ministers informed in a timely and apposite manner.

Active liaison with brigades is continued in order to gather and share information. Most brigades now charge for information so a system of quid pro quo has been adopted whereby small-scale tests, copies of published information etc is exchanged. The closest links are with the local brigades and mainly with London as a continuation of the liaison on their Real Fire Research Project started several years ago. Data from this project is being used in the fire safety engineering part of the contract.

Contacts with other investigators is maintained through meetings, lectures, telephone calls and face to face meetings where mutually convenient. It may be helpful to point out that the brigades are being urged to concentrate on 'Community Fire Safety' and the reduction of arson. Some have chosen to create new internal units at the expense of fire investigation. FRS, amongst others, is seeking to influence this choice of where to place resources with the result that some brigades are rethinking their approach as they recognise the value of information from real fires. Other investigators concentrate on establishing cause and blame for the fire and are rarely interested in the lessons to be learned or the broader implications. In order to maintain this flow of information the Project Leader does not seek to be involved in forensic investigations with court attendance so there is no conflict of interest with other investigators particularly in the consultancies.

The author is maintaining contact with manufacturers on the use of their products and the dialogue with the PVC-U industry has been broadened through taking part in a BRE seminar on updating the industry on the use of its product. Preliminary discussions have started with the 'pod' industry on the production of completed room units that can be craned into place in an existing shell.

Feedback is maintained with other research projects within FRS where there is a government client and the author is often involved as advisor to provide a realistic approach to experimental work.

3. FINDINGS

3.1 Fires investigated

The fires are listed in chronological order and generalised occupancy type rather than purpose groups. The summaries are based on a combination of visits to fire scenes and discussions with fire investigators where there are implications for Building Regulations. Some summaries are added purely for interest.

(LFCDA) indicates where brief details only were supplied by London Fire Brigade; greater detail is indicated by the name of the brigade in full.

GROUP 1 - RETAIL PREMISES

County Mall car park, Crawley, Sussex, 19 June 1999 (West Sussex Fire Brigade)

Tong Garden Centre, Bradford, 16 September 1999 (West Yorkshire Fire Brigade)

Furniture superstore, de Mandeville Gate Retail Park, Enfield, 30 September 1999 (LFCDA)

Shopping Precinct, Old Street Underground Station, EC1, 22 October 1999 (LFCDA)

GROUP 2 - FACTORIES/LARGE STORAGE AREAS

Casa Cucina warehouse, Enfield, 24 May 1999 (LFCDA)

Nestles. Hayes, 13 July 1999 (LFCDA)

Frontline Foods (aka Buxted), Gorleston, Norfolk, 22 July 1999 (Norfolk Fire Brigade)

Air fare, Girlingway, Hounslow, 31 July 1999 (LFCDA)

Plastics factory in Paignton, 9 December 1999

GROUP 3 - MULTIPLE OCCUPANCY BUILDINGS

Royal Albion Hotel, Brighton, Sussex, 24 November 1998 * *updated information* (East Sussex Fire Brigade)

Westmoreland Drive, Sutton, 5 April (LFCDA)

Lucas Court, SW11, 20 April 1999 (LFCDA)

Mulgrave Primary School, South London, 3 May 1999 (London Fire Brigade)

Garnock Court, Irvine, 11 June 1999 (Strathclyde Fire Service)

Molly Zak Nursery, Woolwich, 12 June 1999 (LFCDA)

Brockfield House, Wolverhampton, 15 August 1999 (West Midland Fire Service)

Soho Office block , London, 2 September 1999 (London Fire Brigade)

Gordon House Business Centre, Kentish Town, London, 18 September 1999 (LFCDA)

Milstead House, East Hackney, London, 2 October 1999 (LFCDA)

HMO, North Audley Street, W1, 3 October 1999 (LFCDA)

HMO, Bramston Road, NW10, 11 October 1999 (LFCDA)

Prior Mansions, Priory Park Road, NW6, 12 October 1999 (LFCDA)

Pioneer House, Coventry, 24 November 1999 (West Midlands Fire Service)

Comfort Inn Hotel, Hayes, 3 March 2000 (London Fire Brigade)

GROUP 4 – DWELLINGS

Brentvale Avenue, Alperton, Middx, 23 May 1999 (LFCDA)

Thatch fire, Flitton, Beds, 5 November 1999

Fatal fire in Nottingham 10 November 1999 (Nottinghamshire Fire and Rescue)

Timber-frame terrace of houses in Basingstoke 12 December 1999

Kendale Road, Bromley, 6 March 2000 (LFCDA)

Brownfield street, Poplar, London, 6 March 2000 (LFCDA)

GROUP 5 – PUBLIC ASSSEMBLY/ENTERTAINMENT

Thamesview Youth Club, Barking, 7 September 1999 (LFCDA)

Austrian disco fires 23 October 1999

GROUP 6 – OTHER AND MISCELLANEOUS

Car park fire in Newcastle 1 April 1998 (Tyne and Wear Fire Brigade)

Car park fire at Gatwick Airport 27 July 1999 (Surrey Fire Brigade)

3.1.1 GROUP 1 - RETAIL PREMISES

County Mall car park, Crawley, Sussex, 19 June 1999 (West Sussex Fire Brigade)

FSIS Ref12/99

On the 12 July 1999, FRS received a telephone call from Station Officer John MacFarlane to tell us about a fire in a multi-storey car park in Crawley. A deliberate fire was started in one car and spread to burn out four others and cause light damage to a fifth. This is contrary to the generally accepted view that car fires in car parks do not spread beyond the car of origin except in very rare cases*. This fire provides another example of unusual spread beyond the car of origin. The brigade had been called to the fire on the second level at 15.22 h on a busy Saturday. The car park served one end of the County Mall Shopping Centre.

After discussion it was agreed that Penny Morgan and Brian Martin would visit the scene the following day. On site we were met by John MacFarlane and ADO Trevor Pilcher, the County Mall Manager, the structural engineer from BSM the contractors doing repairs and a representative from Bison who had provided the concrete slabs used for floors and ceilings.

The building

Concrete multi-storey car park, one of two, immediately adjacent to large shopping mall providing car parking for 1700 cars on 4 levels and open on three sides, see Figure 3.1.1. There is stair access to the shopping mall. The overall length of the car park is about 200m. The short axis is 16m created from post tensioned beams at 6m intervals on concrete columns, see Figures 3.1.2-3. The floors and ceilings of Bison slabs 150mm with 70mm screed flooring finish. The floor to ceiling height is 2.1m. Fire resistance is minimal due to the open nature of the car park and there is 2m space between the car park and the wall of the mall. There are no detectors or sprinklers, dry risers were provided.

The fire

Deliberate ignition by two 12 year old boys of a cardigan left in an open convertible in the south side car park. The fire was discovered by car owner. Either she or another woman shopper reported the fire to a security guard who raised the alarm using a break glass call point.

Fire damage

There was damage to the cars in the immediate vicinity of the convertible ie to two cars on one side, one car on the other and very minor spread to a fifth car from melting light

* The one case which is quoted occurred when a car fire on one level spread up to involve a car on the half level above. This was in Preston in the early 90s.

fittings, see Figures 3.1.4-5. The worst damage appears to have been from the open convertible and the sun roof of the car on the side worst affected. The brigade arrived within five minutes and estimate that water was being put onto the fire within 15min of ignition. It took 50min before the STOP message was sent.

Spalling will mean replacement of three 1200mm wide Bison slabs in the ceiling above the damaged cars, Figure 3.1.6. However, only cosmetic repair will be needed on the beams as the spalling was light and on the floor below the car first ignited, Figure 3.1.7.

Spread of smoke
Heavy black smoke billowed out of the open sides of the car park making firefighting quite difficult as smoke logging was down to 0.6m off the floor. They were also hampered by people returning to their cars and leaving the car park despite the presence of firefighters. We reported similar behaviour in the Watford car park fire in 1992 (FSIS Ref 27/92) where people stayed close to their cars while fire in a car on the exit ramp was brought under control.

Injuries
No one was injured in this fire

Implications for Building Regulations

The damage to several cars raises concerns about the perceived risk in a car park.
The means of escape was quite adequate the estimated 5ooo people present were able to leave the mall by the exits and gather in the memorial gardens to the north of the mall.

Comments

Received wisdom based on experience has been that a car fire will rarely if ever spread beyond the car of origin – in this case the open nature of the car first ignited and the sun roof in the one next to it appear to have contributed to the destruction of four cars. One car moved forward during fire fighting heading towards the fire fighters and another slammed into one of the columns making fire fighting awkward to achieve.
West Sussex have put out a FINDS message and have evidence from East Sussex, London, Hampshire, Grampian and Mid-Wales that car fires in multi-storey car parks usually involve more than one car despite rapid attendance by the brigade. London had an example on Saturday 10 July in the sub-level car park at Benthalls in Kensington where one car ignited, the petrol tank exploded and involved two other cars eventually spreading fire to three more. Grampian reported using thermal imaging to find the fire as the smoke was so dense.

Consultants are basing fire protection on the typical 2MW size fire and therefore no need for sprinkler protection. From FRS work for Eurotunnel Safety Authority we would expect a car fire to produce 6-8MW at peak and that sprinklers would reduce the size of the initial fire. The cost of installation would be offset by savings in lost revenue and repairs. We are not aware of any serious injuries associated with these fires so this is not a life safety

matter at present. However, it may be useful to add that by June 2000 London Fire brigade were advocating the use of venting only in basement car parks. The reason is that where there is limited ventilation the sprinklers tend to bring the smoke down towards the ground and the brigade cannot find which car is burning. They argue that venting will provide them with a clear view of the burning car, and that sprinklers tend to be ineffective against a fire burning inside a closed car.

Figure 3.1.1.1 General view of the car park, note the heavy smoke staining (photo courtesy of West Sussex Fire Brigade)

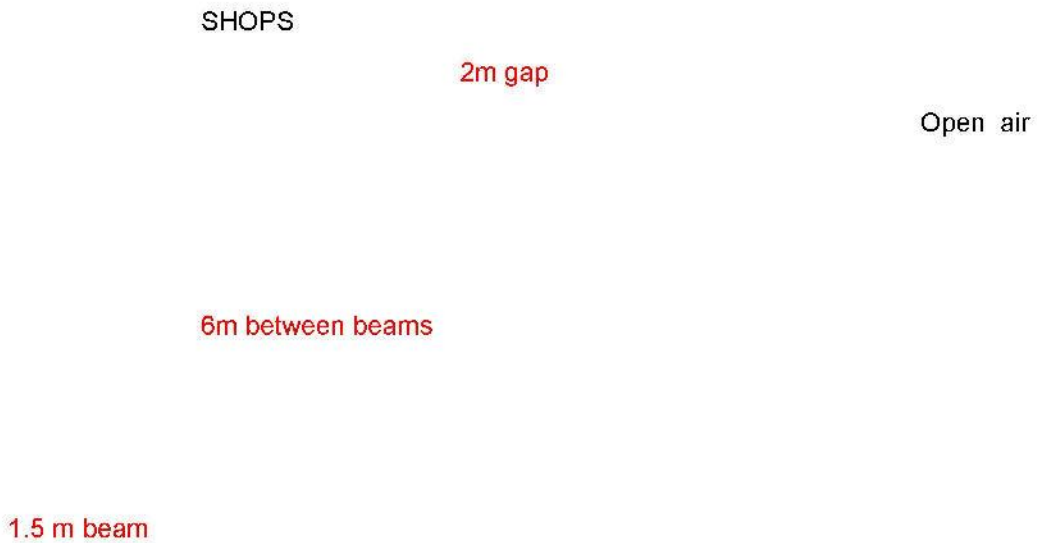

Figure 3.1.1.2 Diagram of a parking bay in plan view (not to scale)

Figure 3.1.1.3 Diagram to show height of parking bay

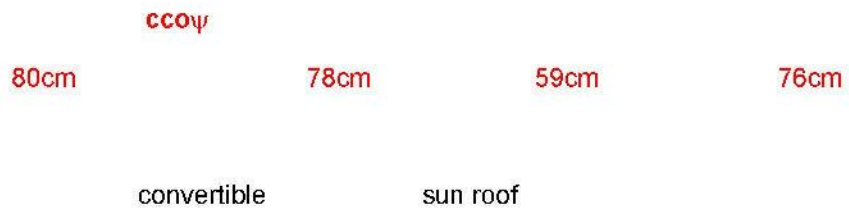

Figure 3.1.1.4 Arrangement of the cars, the blue arrows show which way they were facing

Figure 3.1.1.5 Remains of the cars

Figure 3.1.1.6 Spalling in the Bison slabs

Figure 3.1.1.7 General view of damaged area minus cars, plus detail of spalling on beam

Tong Garden Centre, Bradford, 16 September 1999 (West Yorkshire Fire & Civil D Defence Authority) FSIS Ref 18/99

Station Officer Calpin contacted FRS about this fire as he was concerned about the behaviour of the polycarbonate sheet roof following the outbreak of fire in this garden centre, see Figure 3.1.1.8.

The building

The premises are certificated for retail use. It measured 115m x 45m with a roof constructed of twin-walled polycarbonate sheets. The premises had been extended over the years to keep pace with the expansion of the business, with most of the display area open to the roof. There was a false ceiling over the offices at the front of the building. There was an AFD system, and the kitchen area was enclosed in a fire resisting construction, see plan in Figure 3.1.1.9. Fire extinguishers were provided. There were no sprinklers. There was CCTV and burglar alarms.

The fire

The first alarm call was logged at 20.43 h. Eyewitnesses reported that the building was completely involved in fire by the time the first appliances arrived six minutes later. The fire appeared to have begun in a blind spot towards the left of the entrance, Figure 3.1.1.10, and flames were clearly visible just beyond the entrance, Figure 3.1.1.11. A Police Constable responded to the burglar alarm and looked into the building and saw a fire in a small office used by one of the franchisees . The only materials in this area were a filing cabinet, mobile phone charger and magazines. There were gas mains going into the building to the right of the front door. The supply became involved in the fire. Offensive fire fighting continued for almost three hours with damping down continuing the following day, Figure 3.1.1.12.

Fire damage and possible origin

As can be seen in the photographs, damage was severe but contained to the retail area with no spread to stacked goods outside the building. The brigade concerns are about the rapidity of spread once the fire had reached the roof and the possible risk in other buildings using this material, Figure 3.1.1.13 shows the distortion of part of this material. They also expect the rebuild to use the same materials.

FRS was sent a copy of the CCTV records and one view outside the offices at the front of the building shows something glowing which then appears in other views as a reflected orange glow which then engulfs the whole area until the camera fails. The intruder alarm was tripped as the fire spread and then the other cameras failed in sequence. The premises had been closed and secured by 18.20 h and just over two hours later the fire spread. In discussion with the brigade there was very little material in that area to account for the fire, however just outside the small office there were plastic wrapping materials

stored above the false ceiling. One theory was that the phone chargers shorted and involved material at high level hence the involvement of the roof material.

Implications for Building Regulations

We share the concerns of the local brigade about the involvement of the polycarbonate material used for the roofing. The effect may have been enhanced by a fire developing in close proximity to this material but with such a large area of roofing the avoidance of injury in a daytime fire is more problematic when large numbers of the public are present.

Figure 1.1.1.8 General view of the damage (all photographs and drawings courtesy of the brigade)

Figure 3.1.1.9 Plan of the retail area (FAS: fire alarm system)

Figure 3.1.1.10 Area where the fire is believed to have started

Figure 3.1.1.11 Glow behind the entrance

Figure 3.1.1.12 Damping down the following day

Figure 3.1.1.13 Distorted polycarbonate at the rear of the building

Furniture superstore, Unit 2, De Mandeville Gate Retail Park, Enfield, 30 September 1999 (LFCDA)

Station Officer Carey from the Fire Investigation Unit in Clerkenwell provided an outline of this fire which occurred in a furniture superstore on the De Mandeville Date Retail Park. The brigade was called at 12.04 h to a fire at the rear of the upper mezzanine floor which was two hours after opening.

The store had been refitted during the previous year which included the mezzanine floor and a manual break glass call point system with smoke detection on the ground floor only. There were no sprinklers.

Although confined to a small area on discovery, the fire soon spread with flames and hot gases rolling under the false ceiling of the mezzanine on the arrival of the brigade. A flashover in this area was reported. The large number of upholstered polyurethane foam filled three piece suites, bed settees, timber display cabinets and units all contributed to the fire. The final damage is estimated at 40% of the ground floor, the whole of the mezzanine and roof. The fire was confined to the one unit. It is unfortunate that the increase in display area with the addition of the mezzanine and fuel load was not matched by an increase in fire protection.

Shopping Precinct, Old Street Underground Station, EC1, 22 October 1999 (LFCDA)

Station Officer Rolfe of the North east Area Fire Investigation Unit provided details of this deliberate fire discovered at 19.09 h.

There is a shopping precinct attached to Old Street Underground Station with storage facilities in the basement levels. A storage space on the first basement level with steel security doors had been left open. This space has access to the lift. A wooden fruit stall, plastic trays and rubbish were involved in the fire. From FRS work on a wooden cart as part of the programme on ' Characterisation of fires for design purposes' we would expect the fire to be about 1.5MW in size. In this case the fire was extinguished using a hose reel.

The investigating officer points out that the fire area was 5m from a defined line that separates the shopping area from the area controlled by the Sub Surface Railway Regulations.

The station was closed for two hours and 70-80 people were evacuated via the platforms. The station was smoke logged.

Comment

The fire is a repeat of one in the same area at 20.08 h on the 7 November 1996. While there are no direct implications for Building Regulations from this deliberate fire it is interesting to report the concerns about the effect of retail fires on the underground/main line rail systems. FRS contacts with Railtrack would imply mounting concerns with the effects on passengers and transport through London and other stations in the UK from fires in adjacent areas. The concept of compartmentation does not appear to hold.

3.1.2 GROUP 2 - FACTORIES/LARGE STORAGE AREAS

Casa Cucina warehouse, Enfield, 24 May 1999 (LFCDA)

Station Officer Hodgens informed FRS about a fire in a large single storey steel frame building of 50m x 40 m, undergoing refurbishment in order to start production and sales of fitted kitchens. There had been unusually rapid fire spread leading to an eight pump fire.

The external walls were a combination of breeze blocks clad in sheet steel panels. The steel truss multi-pitch roof consisted of asbestos sheets or steel sheet insulated with polystyrene slabs was topped by weather resistant membranes. The roof height varied between 5m and 6m.

The building

The building had previously been used for vehicle crash repairs. It was taken over by the Casa Cucina kitchen company in order to expand their business and was acquired following an earlier fire at their premises in Basildon. The new layout was to provide a showroom and office at the front of the building with roller shutter door access to a loading bay and warehouse at the rear. There was no AFD of fire suppression system. The existing Fire Certificate applied to its previous use.

At the time of the fire the showroom was complete and open to the public. Stud partitioning separated this area from the rest of the building; there was a false suspended ceiling at 3m of fibreboard tiles. Lighting was varied and included spotlights for the kitchens and downlighters in the ceiling.

The factory area was still being renovated with the concrete floor about to have a new screed laid. Externally the four roof pitches were being concealed by the addition of sandwich panels with 50 mm EPS core on a steel frame to give the illusion of a larger building with a flat roof. Window openings had been made in these panels. The pitched roof itself was being insulated and weather proofed as indicated above.

There was going to a first floor added to provide residential accommodation for the Managing Director.

The fire

All the staff and contractors had left the premises which were locked up by the Managing Director who left between 18.15h and 18.30 h. At 18.48 h the first call was received by the brigade from two plain clothed police officers who were 500 m to the rear of the premises.

On arrival at 18.51 h smoke and flames were issuing from the middle of the roof. Shortly afterwards fire was visible through the windows. The BA crew had to withdraw from the showroom at 18.53 h when flame was seen rolling under the ceiling. Senior staff arrived and provided information about the layout and presence of gas cylinders.

The cause of the fire is recorded as unknown and might have been started by contractors smoking/problems with lighting.

Comments

However the fire started, once the polystyrene-filled (EPS) panels became involved severe damage to the building was very likely. The fire was confined to the building and did not spread to involve neighbouring properties.

The choice of highly combustible elements on the outside of buildings will always present a risk of property damage. The vulnerability of a building during renovation is always going to be high. Although there is guidance from the insurance industry on construction site safety and implications within the Workplace Regulations there may still be a role for guidance allied to the Building Regulations. Refurbishments can involve choices of materials and specifications that are cost led rather than safety led which may be the reason for choosing an EPS panel rather than polyisocyanurate (PIR) or mineral wool cored. Once in place and finished with all seals in place there is no reason to expect the EPS panel to present a greater risk but during the fitting stage as in this case the risk is much greater than with other materials.

Implications for Building Regulations

There are no direct implications from this fire other than the consideration of guidance on the implications of specification and choice of materials for renovations and refurbishments.

Nestlés, Nestlés Avenue, Hayes, 13 July 1999 (LFCDA)

This year's fire occurred early in the morning with the call to the brigade at 05.53 h. On 7 September 1998, reported in BRE Output No 76571/5, a fire started during maintenance when hot sparks were ejected from a flue and ignited a corner of the roof. This followed a fire the previous year, 21 July 1997 attended by the same investigating officer, Station Officer Marshall-Smith.

In this case there was a fire in the seven-storey coffee silo which was the result of safety cut-out systems operating and venting gases and coffee particles to the atmosphere . Hot embers ignited waste material in the guttering which then spread into the combustible core of the sandwich panel cladding. 25 per cent of the roof was damaged.

There would appear to be a management/maintenance problem at this site which could be addressed by fire safety engineering procedures. There are no direct implications for Building Regulations.

Frontline Foods (aka Buxted), Gorleston, Norfolk, 22 July 1999 (Norfolk Fire Brigade)FSIS Ref 13/99

FRS was alerted to this fire in a sandwich panel building by Station Officer Barnett of London Fire Brigade who had in turn been alerted by Norfolk Fire Brigade. The following is a summary of the information obtained from Divisional Officer Larkowsky of the Fire Investigation Team in Norfolk.

The building

The mainly single-storey building, 100m x 40m, included a two-storey office area. The internal partitions consisted of polystyrene-cored sandwich panels. The building was used for chicken processing. The building was an extended older building previously used by Buxted. This meant that there was a fire resisting barrier across the building where the old external wall had been. There were no sprinklers in the building.

There were two refrigeration plants using ammonia, one either side of the building, various cylinders and an electricity sub-station. There were two 1.5 tonne deep fat fryers for food preparation at high level within the building. There had been several calls to HSE raising concerns about the effects of hot oil in the vent stack. Soya oil was used in the fryers and because of the Genetically Modified Food debate a pure sourced oil which had a lower flashpoint than the mixed source oil had just been brought into the process. Unfortunately this flashpoint was all too close to the working temperature of the oil during cooking and is believed to have caused the fire.

Front Line Foods were contracted to supply Kentucky Fried Chicken and Bernard Matthews with chilled prepared chicken.

The fire

The brigade were called at 14.19 h to a fire in the roof which spread towards the office area. As soon as the call reached control Station Officer Kennedy was asked to attend as he had a good working knowledge of the building. He arrived at 14.29 h by which time the fire was through the roof. Because he had already informed the fire crews about the presence of the sandwich panels defensive fire fighting tactics were being used to contain the fire. Kennedy went up in the Police helicopter and was able to monitor the fire's development from above using thermal imaging. The roof collapse was identical to that seen at the Banham fire on 3 August 1998. This earlier poultry process fire was the first sandwich panel fire in Norfolk and had caused the greatest direct loss in the UK, in excess of £30m. Kennedy was able to advise on the best positions for cooling jets and where the fire was moving.

The smoke plume from the fire was visible for more than nine miles.

Injuries[*]

There were no injuries but three persons were unaccounted for in the adjacent building for a period during fire fighting from 14.42 h until 15.14 h.

Comments

There are no direct implications for Building Regulations from this fire. It is interesting to point out that food process buildings are vulnerable to fire whatever their age. In discussion with DO Karlowsky he told me about a recent fire in Yarmouth where there was a fire in a refrigeration plant in one section of the building involving 60, 000 litres of fuel. The building had bee in use for 130 years and the combination of the fire and fish coming in through two doors over that length of time meant that the building was gutted in 5 minutes and the walls moved despite being of masonry construction.

From September 1999 there will have been a new command system in the brigade involving risk assessment and making use of local knowledge as in the Front Line fire.

Air fare, Girlingway, Hounslow, 31 July 1999 (LFCDA)

[*] On the 17 July 1999, two firemen were injured by falling debris during defensive fire fighting at the Dawnfresh Seafoods plant in Uddington in Scotland. EPS-cored sandwich panels were involved in the fire.

Station Officer Treadaway from the North West Area Fire Investigation Unit kindly passed brief details of this fire to FRS.

A fire started in a loading bay and was identified from video footage as having started in a light fitting. The fire involved the sandwich panels used as partitions. The building was used as a warehouse for food, beverages and tobacco.

Plastics factory in Paignton, 9 December 1999

Press reports on the fire at Wilton Bradley plastics factory in Paignton led to the evacuation of 400 people from their homes. Clouds of smoke and fumes drifted into residential areas. Divisional Officer Connelly confirmed that the major problem had been the toxic smoke produced as a result of the fire. Ten people were treated for smoke inhalation, three were taken to Torbay hospital.

Figure 3.1.2 1Toxic fumes and chemicals were released in the blaze. (from the BBC website)

While there are no direct implications for Building Regulations the environmental effects from this type of fire do not appear to be subject to any controls. The brigades are increasingly concerned about the effects on local residents and their fire fighters, particularly during rest periods close to the fire scene.

3.1.3 GROUP 3 - MULTIPLE OCCUPANCY BUILDINGS

Royal Albion Hotel, Brighton, Sussex, 24 November 1998 * *updated information* (East Sussex Fire Brigade) FSIS Ref 17/98

I reported this fire in last year's summary of fires investigated (BRE Output No 76571/5). Briefly, a breakfast cook was frying eggs which flared up and ignited fat deposited in the extract duct which ran in the old dumb waiter shaft. The resulting fire spread out of the timber shaft into the stripped out fifth floor of the hotel which was about to be refurbished. The fire caused collapse of much of the central part of the building and the hotel is currently undergoing extensive repairs. The initial loss was put at £6m. There were no injuries but one couple managed to sleep through much of the first two hours of the fire

fighting. Extract ducts have been implicated in many major property loss fires; fortunately there have been no deaths associated with them so far.

While the implications for Building Regulations have not changed it may be useful to include additional information from the very detailed report written by ADO Brown.

The extract duct

The extract duct had been installed when the kitchen was moved to the basement in 1981. Within the kitchen the ducting consisted of stainless steel trunking of square cross section running horizontally round the room. There was a steel hood over the cooker with thick metal mesh filters to cut down the transfer of grease into the duct. Vertically the duct ran inside the angle iron framework of the dumb waiter. Fire resisting cladding was attached to the framework. The duct went through the dormer roof on the fifth floor at an angle rather than horizontally which meant that it would have been difficult to seal. The vertical section did not appear to have any access hatches for cleaning. There were no fire dampers in the ducting (as would be expected in a non-domestic kitchen where the build up of grease would prevent any damper from operating). The ductwork was secondarily protected by fire resisting enclosures up to and including the fourth floor. It is not clear what protection was present on the fifth floor. In order to be certificated such an enclosure was required but when the fifth floor was stripped out for refurbishment it is not clear how much fire resisting material remained in place.

Cleaning

Cleaning the ductwork is not a requirement of the Fire Certificate issued under the Fire Precautions Act 1971. But it is a requirement of the Hygiene Regulations.

The vertical ducting was cleaned in March 1997 and the cleaning company issued a certificate which was valid until 25 March 1998. When new owners, Britannia, took over the hotel in 1997 the cleaning company was not used. Britannia Hotels have a procedure for Extract and Kitchen Canopy Cleaning. Part of this procedure involves using the following equipment to carry out the cleaning.

Cleaning spray

Buckets of hot soapy water with degreasing agent added

Heavy duty rubber gauntlets

Goggles and face masks

Wire scrubbing brushes

Scrapers – short and long handled

Sponges.

ADO Brown points out that this is to clean a 0.5 m diameter tube of five storeys approximately 20 m in height without any obvious access. Britannia Hotels could not

supply any details of when the duct had last been cleaned. The filters in the canopy were usually cleaned on a Friday. The fire occurred on a Wednesday when grease would have built up on the mesh filters to provide a flammable coating.

Comment

This fire and the one in Terminal 1 at Heathrow in 1997 have been instrumental in persuading the insurance industry to look at the risk presented by these types of extract duct. At the same time they have been preliminary discussions about the development of a realistic new test for the filters used in commercial kitchens. The current test is one devised and carried out at the Underwriter's Laboratory*.

Westmoreland Drive, Sutton, 5 April (LFCDA)

Station Officer Carey reported an unusual mode of fire spread in a purpose built block of flats involving plastic window frames.

A fire involved half of a two-bedroomed flat on the second floor starting at 08.23 h. The fire spread by convection from the room of origin up to the third floor.

The windows on the second floor were softwood timber units while the ones on the floor above were PVCu double-glazed units which appeared to assist spread into the upper floor.

* UL Standard for Safety for Grease Filters for Exhaust Ducts, UL 1046, Second edition dated 30 July 1979

As the building was owned by a Housing Association the difference in window type can be explained by the different individual owners.

There are no direct implications for Building Regulations other than the need for guidance on the implications for refurbishment choices of materials and possible outcomes in the event of fire.

Lucas Court, SW11, 20 April 1999 (LFCDA)

Sub Officer Foulkes contacted FRS to report his concerns about the smoke spread from fires in this block of flats over a five year period. Smoke reaches the fire escape stairs of each maisonette due to ill-fitting fire doors.

In the first fire on the 23 May 1994, the brigade were called at 13.21 h to a fire in an armchair ignited by a candle. On the 5 September 1998 at 03.56 h the brigade attended a fire in a polyurethane foam filled chair probably ignited by smoker's materials. The chair was in an access corridor. On 2 April 1999 a deliberate ignition of an armchair close to a timber door led to brigade attendance shortly after 01.10 h.

In all three cases smoke from the fires reached the escape stair and compromised that route for occupants needing to leave.

As there is no continuing control on buildings of this type, there are no implications for Building Regulations.

Mulgrave Primary School, Woolwich, SE18, 3 May 1999 (London Fire Brigade) FSIS Ref 10/99

Station Officer Vaughan-Davies alerted FRS to this fire as he was concerned about the method of construction which appeared to be similar to the CLASP system which had

been identified as a contributor to several serious fires in schools and other buildings. The main distinguishing feature had been continuous voids above the false ceilings.

The building

Flat-roofed mainly single storey school buildings arranged in a U-shape. The building dated back to 1949 and had been extended in 1969. The construction was steel frame with plywood exterior; internally studs with plasterboard partitions; fibreboard tiles in the suspended ceiling. The roof had a plywood deck sealed with polymer-modified bitumen; 50 mm fibreglass insulation above the fibreboard ceiling tiles. There were covered walkways linking across the U.

Figure 3.1.3.1 Outline of ground floor Block A (not to scale)

The fire

A deliberate fire was started in the Reading Room, 7.4m by 7.4m, in one leg of the U. The brigade were called at 12.40 h, Figure 3.1.3.2. The open plan nature of the classroom arrangements meant that once started there was very little to restrict the spread of fire. One of the ceiling tiles was missing which allowed fire to spread above the false ceiling and to attack the underside of the roof.

Implications for Building Regulations

There was very little compartmentation in the school now it was being used in such an 'open' way. The missing ceiling tile allowed the fire to spread at high level.

Figure 3.1.3.2 The fire soon after the brigade arrived, the gym is to the left

Figure 3.1.3.3 External view of a corner of the school

Figure 3.1.3.4 The ceiling and underside of the roof

Figure 3.1.3.5 Damage to the Reading Room, note remains of ceiling tiles, identified as fibreboard by the brigade investigator

Figure 3.1.3.6 Firefighters outside the room of origin, inside the U. Note the remains of the covered walkway (all photos courtesy of London Fire Brigade)

Molly Zak Nursery, Woolwich, 12 June 1999 (LFCDA)

Station Officer Vaughan-Davies provided brief details of this second fire involving CLASP type construction in the South East of London. The building had been used a nursery school but had suffered a spate of fires of which this was the fourth. After the third it had been unoccupied. The Police were investigating the incident.

Garnock Court, Irvine, 11 June 1999 (Strathclyde Fire Service) FSIS Ref 11/99

BRE was approached by the Irvine Council to look at the performance of the external cladding on one of their four high rise blocks following a fatal fire in the sitting room of one of the flats. The following is a simplified version of the report prepared for them and the Procurator Fiscal's office who were leading a sudden death enquiry.

The building

Garnock Court is a flat-roofed fourteen storey-high rise residential property built in 1968. It was constructed of Wimpey No-Fines concrete and faced on the vertical line of the living-rooms between the windows with concrete and mosaic. The original window frames were timber. Internally the flats are lined with Paramount partitions ie two layers of

plasterboard with egg-box filling; the same material is used for all the partitions. The door from the living-room to the hall appeared to be on rising butt hinges which suggests that his was a fire door separating this part of the flat from the rest of the accommodation. The building is all electric. There is a communal TV supply in the corner of the living-room. Water and electricity services are placed behind the airing-cupboard and reached by a cupboard door in the kitchen.

There are central lift and stairs services in the centre of the block with a separate access to the rubbish chute. Garnock Court is one of five similar blocks affording four two-bedroom flats on the thirteen upper floors and three flats on the ground floor, see typical layout in Figure 3.1.3.7. Each flat occupies 10m by 9m and has 3m high ceilings. All the flats were fitted with smoke alarms; tenants are responsible for changing the batteries.

The buildings suffered damp penetration and in 1989 invitations to tender were sent out for a partial refurbishment, concentrating on improving the roof and upgrading all the windows to double-glazed PVC-U. In addition, aluminium cladding between the windows on the living-room face was planned to reduce water penetration in those parts of the blocks. However, due to the unavailability of suitable aluminium, its cost and the need to complete the works in 1991 the specification was altered after discussion between the architect, engineers and contractor. This resulted in Sunline, the supplier of the windows also supplying Abacus panels, a glass reinforced plastic (GRP) material, in a custom-designed system for all five blocks on the living-room faces. The new system also changed the configuration so that the windows were now enclosed in a GRP pod; there was no insulation behind the GRP. Each block was fitted with a different coloured material Figure 3.1.3.8, Garnock Court being a deep yellow.

The flat roof was covered with a new tiled surface, the water tanks redone and overclad. The refurbishment was regarded by Irvine Building Control as being a window replacement scheme and no application for a Building Warrant was made. There are no drawings available of the scheme after this length of time as files are kept for seven years only. Technical Services are aware that their engineers did a number of tests to ensure that the cladding could be fixed to the building.

Remedial measures

The Council have made the decision to remove all the material associated with the 1991 window replacement and start again. Technical Services opted for composite aluminium and timber windows which are fully openable to allow cleaning. The spandrel panel to be an external insulated render of panels between the windows of a non-combustible material. The render to be taken round the corner as the outer edge of the building is No Fines/nib/column/No Fines in construction. A Building Warrant has been applied for.

The fire

As the fire may be the subject of a fatal accident enquiry and we have not investigated the cause in any detail. We report here the outline of the fire development as told to us

by Strathclyde Fire Brigade and what we saw in the block. The brigade provided some background to the fire in that the fatality was the same tenant who had been involved in a bedroom fire on the sixth floor in January 1999.

The brigade were called at 12.50 h and attended soon afterwards and discovered a fire external to the building involving the GRP on three floors above the fifth. This rapidly spread to involve all floors from the fifth up to the roof. The video from Tesco's security camera shows full involvement 15minutes after the call to the brigade and for the next seven minutes. The video shows even burning up the external surface of the GRP with the production of flames and dense black smoke. This indicates the involvement of the GRP alone rather than the contents of the flats as the burning pattern would vary according to the materials burning. The smoke lightens towards the end of the video as water from fire fighting takes effect.

Firefighters wearing breathing apparatus had difficulty reaching the upper flats as the stairs on the sixth and seventh floors were blocked with discarded furniture that they had to climb over. Although there were dry risers on every floor there are practical limitations on fighting fires on nine floors simultaneously. These range from subjecting firefighters to increased heat, loss of visibility, limited working time as well as potential problems from loss of water pressure. Thus the brigade tackled the fires on three floors at a time.

The living-room fire on the fifth floor

We understand that the tenant of the fire flat lived with his daughter who was mentally handicapped. He was confined to a wheelchair but the brigade reported that the fatality had been sitting very close to the window in a polyurethane foam-filled armchair in the corner of the living-room. A fire started in the living-room and involved that armchair. The tenant's daughter was able to leave the flat and she survived the fire.

The living-room was badly damaged by fire , Figure 3.1.3.9, with high level damage immediately outside in the hall, Figure 3.1.3.10, to about 1m down from the ceiling. Heavy smoke staining was seen elsewhere and was down to floor level in the kitchen and hall. The brigade reported that the front door, which is a fire door, had kept smoke from reaching the access corridor. The wind speed at the fifth floor was recorded as being 2.5 km/hour, this was a very still day. It is also likely that many of the living-room windows were open at the time of the fire or were opened by tenants on hearing the alarm and then left open as the occupants evacuated the building.

The brigade view this as a straightforward flat fire with tragic consequences for one of the tenants.

Fire on the upper floors

Access to all the upper floors was compromised by the presence of discarded furniture on the emergency staircase; a two-seater sofa on the sixth floor and a single chair on the seventh floor. Working conditions for the firefighters were very difficult because of high

ambient temperatures as well as the hot smoke and gases from the burning GRP entering the flats through the living-room windows. Smoke had penetrated the stair-well from the upper flats because tenants left doors ajar and because of the firefighting activities of the brigade. Ventilation in the common access lobbies was very limited and it took a long time for the smoke to clear.

The brigade reported that debris was falling off the building and resulted in the ignition of the roof and a tyre of one of their appliances. Some windows were open and some were opened when people heard the alarm and saw there was a fire. Because of this smoke and hot gases penetrated all eight flats above the flat where the fire started. Operationally, it was only possible to tackle the fires in the flats on three levels at a time. This meant that there had to be a delay in fire fighting and the flat on the twelfth floor became the worst fire damaged with loss of the partition between the living-room and the bedroom. However, they pointed out that the same techniques would have been used even if this had been a night-time fire.

There was no damage to the roof apart from smoke staining on the edge panels.

The brigade sent a STOP message at 15.23 h. Fire investigators were on the scene until late that evening.

Means of escape and rescues

By the time the brigade arrived most people had left the building. Three people were rescued from the seventh floor on the fire side of the building early on during fire fighting. People on the non-fire sides of the building were encouraged to stay in their flats by firefighters on the corridors.

Later in the afternoon one elderly lady who suffered from asthma was taken out of the building using the hydraulic platform from the opposite side of the building rather than walking her out of the building and climbing over the discarded furniture. She would have been safe in her flat but this action was taken as a precautionary measure. This led to a fifth person asking to be taken out of the building, the hydraulic platform was used again.

Observations by the BRE team

The BRE team from FRS and Scotlab were given access to an undamaged flat. It was evident that the GRP pod surrounding the window curved round the window sill and that a separate spandrel panel met the window pod. The timber support and the edge of the PVC-U is covered by the GRP pod. The spandrel GRP is fixed into the old mosaic; originally the spandrel consisted of No Fines/render and a mosaic decorative panel.

The PVC-U windows provided two openable panes with two smaller fixed ones beneath them. There was a trickle vent over one of the larger panes, see Figure 2. The windows have two open positions and then the full 'roll' to allow cleaning. A similar opening system

will be used for the replacement windows. We noted small areas of rust/ spotting on some window hinges indicating that water penetration is still a problem. There was slight discolouration on the ceiling wall junction in some bedrooms and the inner window sills showed evidence of damp in some flats.

The damage in the fire flat was confined to the living-room with heat damage and heavy smoke staining in the kitchen. The top edge of the GRP spandrel panel immediately below the window where the fire started appears undamaged and the gaps behind the panel are clearly visible, Figure 3.1.3.11.

On the sixth floor in the flat immediately above the fire flat there is evidence of heavy smoke staining and heat damage but little evidence of burning of the contents.

On the twelfth floor more extensive damage was probably the result of delayed fire fighting as this flat was in the last group to be tackled by the brigade. It is also possible that there was no door to the living-room as the burn pattern in the hall looked to be even on both sides. It may, however, be the result of the door burning through. The hall cupboard outside the bedroom adjacent to the living-room had been turned round to afford a cupboard for the bedroom. It may be that the alterations had opened up the partition wall between the bedroom and living-room and provided a route for the fire to penetrate it and destroy it.

Ventilation from the access corridor next to the stairs consisted of small holes in what appeared to be replacement windows.

Comments

The damage noted was generally heavy smoke staining and cracked glass, which indicates that there was penetration of smoke and very hot gases *into* the flats. The heavy staining is usually associated with the deposition of 'cold' smoke from a fire elsewhere. This supports the view put forward by the brigade and illustrated in the Tesco's video that the damage to the flats on the sixth floor and above was from the burning GRP.

Fire fighters had to tackle fires on nine floors and did so on three levels at a time. They were hampered by the presence of discarded furniture on the emergency stairs on the sixth and seventh floors. Ventilation from the access corridor appears to have been minimal. However, if it had been a larger fixed opening it is possible that hot smoke would have made the occupants on the rear of the building very uncomfortable and more of them may have wished to leave the building whereas they were safe in their own flats. Openable ventilators could have been useful in clearing the corridors of smoke and hot gases to assist the firefighters.

Figure 3.1.3.12 is of the aftermath of a fire in Glasgow House, London on the 15 March 1996. This shows the expected vertical spread from a severe fire in a flat where two floors show heavy smoke staining, lighter staining on the fourth and none above. We would

expect to see this sort of pattern indicating a fire moving *out* of a building regardless of the type of construction and not that seen in Figure 3.1.3.13, Garnock Court.

In the case of the fire in Garnock Court the severity of the initial fire and its position close to the window has resulted in the plume of smoke and hot gases from the fire moving out of the building. Initially the plume would have been small due to the close proximity of the fire to the open window and therefore would have tended to have adhered to the surface of the building and the GRP. The plume will have ignited the GRP and remained in contact with it and generated a self-propagating fire. This was assisted by the cavities behind the spandrel panels which allowed fire to attack both sides of the GRP. The heavy black smoke and flames seen on the Tesco's video support this view that the GRP was the main material involved.

The remedial measures planned for the high rise blocks in Irvine should address the problems identified ie damp penetration and the avoidance of an external route for fire spread.

Implications for Building Regulations

The implications with respect to the cladding have been thoroughly explored by the Select Committee for the Environment since this fire.

Figure 3.1.3.7 Typical upper floor plan

Figure 3.1.3.8 External view of the GRP cladding, Garnock Court is on the right

Figure 3.1.3.9 Corner of the fire flat where the fire started

Figure 3.1.3.10 High level damage in the fire flat, note destruction of the Paramount board on the left

Figure 3.1.3.11 Indication of the size of the cavity behind the spandrel panel

Figure 3.1.3.12 Glasgow House fire, London, 15 March 1996. The expected view of exterior showing fire damage

Figure 3.1.3.13 External view of Garnock Court after the fire June 1999

Brockfield House, Wolverhampton, 15 August 1999 (West Midland Fire Service)FSIS Ref 14/99

Divisional Officer Davies telephoned FRS with details about a fatal fire in Coventry. Following a letter of invitation, Penny Morgan and Brian Martin visited the site on 1 October after a briefing at Fire Brigade headquarters with D O Davies and D O Ron Field and ADO Peter Smith. Deputy Chief Fire Officer Frank Sheehan joined us on site.

The building

This was a local authority owned 23-storey high rise block of flats built in the 60s. Four flats per floor round a central lift landing, two fire doors to single exit stair at one side of the building, Figure 3.1.3.14 The ground floor has only one flat and the entrance foyer provides access to lifts, store rooms, power and water supply inlets, laundry and caretaker's office, Figure 3.1.3.15. Access to the rear of the building via a single fire door, Figure 3.1.3.16

Following a long history of vandalism and other problems, a refurbishment scheme was set up under a management board comprising local authority chairman and residents.

This resulted in the addition of a secure lobby entrance in addition to the existing one. The lobby and foyer were fitted with new lighting and CCTV with cabling for security doors hidden above new suspended ceiling of painted plywood. Security was improved by the provision of inner door fob keys with fail safe secure; this means that people can get out of but not into the building.

Similar schemes were set up for neighbouring blocks, such as Campion House, Figure 3.1.3.17 shows the two front entrances. Campion used non combustible tiles in its ground floor ceiling.

The fire

The tenant of the ground floor flat piled rubbish bags in the corner of the foyer across from his front door and ignited them, see Figure 3.1.3.15. This was recorded on video by the CCTV.

Spread of fire and smoke

The fire spread to involve the ceiling and cabling above it, Figure 3.1.3.18. Once fire had penetrated the door of the cupboard to the power and water inlet at the rear of the foyer, close to where the fire started, smoke spread upwards throughout the building and onto the landings, see Figure 3.1.3.19. There was very little separation between floors. We saw smoke staining in a flat on the 21st floor, Figure 3.1.3.20.

The rooms off the foyer were available for storage and were filled with furniture and other goods at the time of the fire. Fortunately these materials were not involved in the fire.

Injuries

There was one fatality – a visitor from Zimbabwe came down into the foyer by lift and could not find her way out, this is recorded on the security video. Her body was found just inside the door to the new lobby, Figure 3.1.3.21. The new lobby remained clean and relatively free of smoke, Figure 3.1.3.22, while the foyer was gutted by the fire.

During our visit we noted the repair work going on, Figure 3.1.3.23 in the foyer of Brockfield House and compared it to the undamaged foyer in Campion House, Figure 3.1.3.24.

Implications for Building Regulations

Compartmentation was ineffective with respect to smoke, tenants stayed in their flats during fire fighting but needed to go onto their balconies for clean air.

The means of escape were compromised by the ready involvement of the plywood ceiling to the foyer which rapidly became smoke logged and obliterated the exit signs which

were at high level . Similarly smoke penetrated the escape stairs for the block and the brigade broke windows to vent this route.

The use of the fail safe fob keys meant that the brigade had difficulty getting into the building as the front door defaulted to locked. They broke in via a window to the entrance lobby as the fob key on the appliance did not work nor did one belonging to a resident. Had the fatality reached the entrance lobby she would have had no problems with opening the door to the outside.

Comments

We share the expressed brigade view about the choice of plywood for the ceiling in the foyer. Had the foyer remained a sterile area with a non-combustible ceiling we would not have expected that the fire would develop and lead to a fatality. It was interesting to note the difference in ceiling in Campion House where mineral fibre tiles were used.

We can only suppose that the management board for the refurbishment agreed the use of the timber despite the presence of a member of staff from the local authority.

It would be beneficial to provide guidance on the implications of such choices of materials in the event of fire.

While it is reasonable to suppose that the entrance area to a residential block would rarely be involved in fire, we understand that the particular resident had burned smaller piles of rubbish in the past. There appear to be implications for the management of the block.

Figure 3.1.3.14 Typical floor plan (WMFS)

Figure 3.1.3.15 Plan of the ground-floor (WMFS)

Figure 3.1.3.16 Fire exit door on ground floor

Figure 3.1.3.17 Entrance porches were added to Campion and Brockfield (WMFS)

Figure 3.1.3.18 Fire damage to the foyer and ceiling (WMFS)

Figure 3.1.3.19 Mr Sheehan feeling the draft coming up into the central lobby on the 13th floor

Figure 3.1.3.20 Smoke staining on curtains and airing cupboard on 21st floor

Figure 3.1.3.21 The fatality was found close to the door to the entrance lobby….. (WMFS)

Figure 3.1.3.22 …while the entrance lobby remained relatively undamaged

Figure 3.1.3.23 DO Davies in the foyer. Repair work is under way, note the top of the new plaster, where the suspended ceiling will be positioned

Figure 3.1.3.24 Foyer in Campion House

Seven Dials, Soho Office block , London, 2 September 1999 (London Fire Brigade)FSIS Ref 15/99

The following is based on the report from the investigating officer Station Officer Townsend which he presented at a conference on cable fires in 2000. Knowing of our interest in unusual fires, he rang me the day after the incident and informed FRS colleagues working on cable fires. He was particularly concerned about the lack of access for fire fighting and the very large volume of material present.

The building

A triangular building of six floors and basement measuring 25 m by 60 m tapering down to 8 m in plan view, see Figure 3.1.3.25. It is part of an island site the remainder of which comprises a major London Theatre and offices, see Figure 3.3.26. It was built around 1890 as a brewery and paper warehouse. The construction is of solid brick walls with concrete flooring up to third floor level and wooden flooring above. Structural columns are of cast iron. Structural beams are of unprotected steel. The timber roof is close boarded and slated.
Three substantial compartment walls divide the building into four "bays". Access through these walls is provided on all floors and each opening has double iron doors. It remained in warehouse use up to about 1960 when it was converted to mainly offices with some light industry and shops/restaurants. The fire started on the third floor of Bay 4 known as "Unit 25", see Figure 3.1.3.25.

A video editing/copying company occupied this Unit. The main entrance to the Unit opened onto a reception area with work desks behind. The Shelton street side was a 'graphics' department using standard PC equipment. To the Earlham Street side was a Control room and editing suite. To the rear of the Unit was the "Head End room". In this room there were racks of video copying machines, videotape storage and some work desks. This equipment would run very hot. An electrical isolation switch was fitted near to the reception area that would shut down all power to this equipment but would leave most other circuits live. Normal routines in this suite could involve people working up to midnight but the last person to leave would operate the power isolation switch.

None of the room partitions in the Unit extended through the false ceiling to the structural floor above. This created a 0.5m (approx.) ceiling void over the whole area in which was laid a considerable amount of communications, mains, telephone, audio and lighting cable (much of it redundant). The timber flooring above was visible within this ceiling void and was said to have been 'old looking'. The floorboards were butt-jointed only and inlaid with steel strips along the joints. The false ceiling was of suspended fibreboard tiles on steel runners. Two self contained A/C Units were mounted flush to it in the Head End Room and a series of 12v spotlights were fitted with transformers within the void. The A/C units were programmed to run for about 20 hours a day switching off only during the early hours.

The communication cables were of two types and served about 60 video machines. Each machine would need 4 cables in and 6 cables out in addition to mains power. There were also about ten TV monitors.

Before the fire

From about 1900h three people were still at work in unit 25, only one of which used the Head End Room equipment. There had been no unusual occurrences or any problems with any equipment. He got a drink from the kitchen and returned to his desk for 30 minutes before leaving. The other two had left about 20 minutes previously. He operated the power isolation switch, locked the main office doors then pulled down and locked the roller shutter and left the premises. A worker in the next office saw unit 25 being locked up. About 15 to 20 minutes later he smelled smoke.

The fire

When the brigade arrived there was thick black/brown smoke was issuing from around a cill mounted A/C Unit and a single extract vent at one window on the third floor in Earlham Street. The Building Manager was present and was able to provide the crew with keys to gain access to suite 25. All access stairs were smoke free and the smoke outside unit 25 was light. On raising the roller shutter crews were confronted with considerable smoke logging. The double door beyond was secured by keypad lock so forced entry was required through the glass panels.

Visibility was extremely poor such that it was difficult even to read Breathing Apparatus (BA) gauges. A hose reel was taken in. There was no visible flame. Heat direction led them to the Head End Room. The heat was very severe yet still no flame or glowing was seen. No progress could be made into the room and fire sounds indicated that the jet was hitting some fire only when directed upwards. No fire debris was encountered. Conditions and BA duration severely limited the effectiveness of initial fire fighting. Crews found that a film was being deposited on their BA masks but it would only smear when attempts were made to wipe it off. Following BA crews found that conditions had worsened to such a degree that no discernible direction could be gauged from the heat output of the fire other than upwards thus the seat of the fire was never found.

Fire damage

On investigation it was decided that the fire originated on the third floor near the centre of Unit 25. Limited site excavation by Station Officer Townsend revealed no indication of ignition at floor level and no evidence of deliberate ignition.

The growth of the fire appears to have been dependent on the cabling in the ceiling void. It is possible that the suspended ceiling remained intact for some time allowing the heat to be sandwiched within the void and to further heat the timber flooring above. Within the void was a layer of 'loft' type insulation. It was apparently quite old and covered with dust and detritus. The criss-crossing of the large unprotected RSJs created pockets of heat

and acted as a barrier to fire fighting jets, see Figure 3.1.3.27. Smoke spread through the flooring into the fourth floor and on up to the top of the building.

The cause of the fire was narrowed down to either failure of one of the A/C units or by long term heating of the GRP insulation and debris in the ceiling void.

Injuries

There were no injuries but two cleaners had to be assisted out of the building down a ladder. They had arrived for work at 19.49 h and soon smelled smoke. On opening the office door they found thick smoke in the corridor and felt unable to exit via the stairs. One broke a window on the Shelton Street side to summon the brigade who were already in attendance.

Implications for Building Regulations

The contribution that cables can make to a fire in a commercial building has long been of concern. Figure 3.1.3.28 shows typical loading. Happily, there are few examples of such fires. When considering the fire resistance of a building some attempt should be made to consider how it may be compromised by so much additional material hidden in ceiling voids as in this case or more commonly in floor voids.

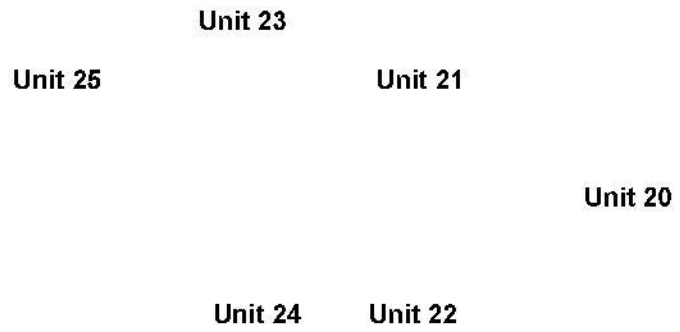

Figure 3.1.3.25 Arrangement of bays and the units on the 3rd floor (not to scale)

Figure 3.1.3.26 External views of the office block - on the next page

(the word 'fighters' is missing from the end of the caption)

Figure 3.1.3.27 Damage to the structural steel

Figure 3.1.3.28 Cable run to adjacent compartment

Gordon House Business Centre, Kentish Town, London, 18 September 1999 (LFCDA)

The brigade were called to a small fire in this stand alone building at 15.27 h on a Saturday. Station Officer Hodgens reports that "a small fire originated in, and was principally confined to, a ceiling mounted extractor fan in an enclosed toilet cubicle on the first floor of the two storey business centre. The section of the building where the fire occurred was currently under refurbishment. Building contractors were last working in the area of the fire approximately 24 h prior to discovery. Premises were provided with AFD (smoke) and a wet pipe sprinkler system fitted with 68 ^{o}C (red) bulb type sprinkler heads.

The fire was discovered by an occupant just before the activation of a smoke detector fitted in the corridor outside the toilet. The toilet had twin doors providing a small lobby. Two sprinkler heads were positioned in the toilet but both failed to operate, despite one being directly above the toilet cubicle door, which was slightly open.

The fire self extinguished before the brigade arrived as there was no ventilation - the toilet was totally enclosed and there was no natural ventilation. The extractor fan was not a new unit but was being re-used during the renovation work."

Comment

It is interesting to note that despite the relatively small area there was insufficient heat generated to actuate the sprinklers, but it must also be unlikely that any fire in such an area would ever trigger the sprinklers. While active measures can be extremely useful one should question the efficacy of fire protection for its own sake. The smoke detector did pick up the small fire, which would have been sufficient to start an evacuation from the building. The role of the sprinklers is at best debatable.

Milstead House, East Hackney, London, 2 October 1999 (LFCDA)

At 13.58 h the brigade were called to the smell of smoke at one of the flats in the purpose-built block. The attending crews found a woman unconscious on the floor of the kitchen and a male child unconscious in bed. There was no apparent fire but a large cooking pot containing the charred remains of food was on the gas cooker covering all four lighted gas rings. The occupants were moved into the fresh air and an attempt was made to resuscitate them. Later, both were pronounced dead at the scene by paramedics.

There was no smoke alarm present in the flat. But there is no legislative requirement for a smoke detector in existing property only for new build. This is the type of incident where we wish there was.

HMO, North Audley Street, W1, 3 October 1999 (LFCDA)

This case is an example of a candle left burning unattended on a window sill. The HMO is a Category 'A' hall of residence used by University College students. The alarms sounded and there was a full evacuation. The brigade were called at 14.07 h. No problems were encountered.

Unlike the previous case, there were smoke detectors present and no injuries sustained by any of the occupants.

HMO, Bramston Road, NW10, 11 October 1999 (LFCDA)

This HMO was a conversion from flats. There was a small fire in the ground floor flat involving a sofa bed which subsequently damaged the flooring below. The brigade were called at 13.21 h. There were no injuries resulting from this fire.

Priory Mansions, Priory Park Road, NW6 12 October 1999 (LFCDA)

Priory Mansions are a purpose built block of flats used as a Category D HMO. Two cooking pots were left unattended and generated large amounts of smoke which filled about 30 per cent of the ground floor. Some smoke detector heads appeared not to function although the incident was quickly identified by the AFD system. The brigade was called at 21.46 h. The AFD record was inspected and found satisfactory by Station Officer Willis of North Area Fire Investigation Unit. However, some residents complained that the alarms were barely audible in their rooms.

Pioneer House, Coventry, 24 November 1999 (West Midlands Fire Service)FSIS Ref 19/99

FRS received a telephone call from investigating officer Station Officer McCabe the day after the fire to which the brigade had been called at 19.50 h. He was particularly concerned about the performance of the internal partitions of strammit board. A few days later ADO Smith invited FRS to visit the scene on 1 December 1999. Penny Morgan met Station Officer McCabe, ADO Smith, and ADO Misson at Coventry. They were then joined on site by Keith Pound technical services Manager and Alan Atkins Repair and Maintenance Manager, Coventry City Council.

The building

This is a flat-roofed, 16 storey lift slab construction built in 1966. There are 6 flats per floor - one and two-bedroomed. Blockwork compartment walls between flats punctuated by service shaft of plywood and plasterboard with strammit insulation between the bathrooms, Figure 3.1.3 29 . Internal partitions of strammit board with plasterboard and plaster skim. The partitions had been put into place and then ceiling plastered up to them, Figure 3.1.3 30. Ceiling plaster is bonded to the concrete floor slab, Figure 3.1.3 31. The warm air heating system has been renewed as have the windows, now PVC-u. Only the corners of the blocks are concrete walled the rest is glazing and insulation panels leading onto an external balcony which could act as a secondary means of escape, Figure 3.1.3 32. The central lift lobby with fire doors lead to the access corridor to the flats. The single central escape stair had limited ventilation at the top from two high level louvered panels and a partly louvered door to the roof, Figure 3.1.3 33-34. There was no detection in the building.

The fire

The fire was believed to have started in furniture in the middle bedroom of a corner two-bedroomed flat. The fire spread throughout flat aided by an open window and front door; 40mph gusting winds aided fire spread.

The fire penetrated the adjacent bathroom of a void flat which fortunately had a closed door. The service shaft allowed vertical fire spread but the fire melted the toilet fittings and caused flooding which dowsed further spread. Fire damage in the lobby outside the flat destroyed or melting light fittings. Furnishing is likely to have been sparse as the flats were mainly used for drug taking; needles, spoons, lighters and foil seen in an adjacent flat. These are termed 'drop off' flats as this is the address where the Giro cheque can be dropped off.

Spread of smoke
Smoke spread out of flat and into staircase which was completely smoke logged by 21.00 h.

Injuries

There were minor smoke inhalation injuries as occupants led out by brigade.

Implications for Building Regulations

Compartmentation was breached in the bathroom area. This block had been examined in the aftermath of the Merry Hill Court fire in 1990 where the poor separation between the bathrooms had been identified. This fire confirmed this route of fire spread.

The means of escape were compromised as the escape stairs became smoke logged. One reason for this was that during fire fighting a bridgehead on floor below which offered a route for the smoke to get into the staircase. It must be stressed that as smoke penetrated the stairs during fire fighting and the louvres could not clear it, conditions became very unpleasant for the occupants and the fire fighters. This has operational implications as crews have to work in BA and attendance is therefore tripled to that expected at the time of build when such smoky fires were not the norm.

Remedial changes discussed included the replacement of the louvres at the head of the stairs with openable vents to keep the stairs clear of smoke. And the addition of brush seals to the internal doors on each floor to allow fire fighting on the fire floor and to maintain clean air in the stairs.

Figure 3.1.3.29 Remains of the partition between the bathrooms

Figure 3.1.3.30 Ceiling plastered up to strammit partitions

Figure 3.1.3.31 Plaster over the concrete slab

Figure 3.1.3.32 View along the balcony outside the fire flat

Figure 3.1.3. 33 Louvres at the top of the stairs..

Figure 3.1.3. 34 ..and the door to the roof

Comfort Inn Hotel, Hayes, 3 March 2000 (London Fire Brigade) FSIS Ref 2/00

FRS received a telephone call from Station Officer Hodgens, LFCDA FIU Clerkenwell as this was the first fire investigated in this type of construction. There were concerns about the degree of fire spread from a deliberate ignition in a pre-assembled bedroom and bathroom pod for the hotel extension. The brigade had been called at 01.23h. Penny Morgan arranged to visit the site on the 8 March.

The building

The fire occurred in a three-storey hotel wing under construction, see Figure 3.1.3.35 to provide an extra 69 bedrooms (£120 per night). This was a pre-engineered building with individual rooms delivered as a pod containing fully-furnished bedroom and bathroom, Figure 3.1.3.36. The pods are craned into position.

The rectangular pods appear to consist of a steel frame internally lined with plasterboard ceiling and walls, chipboard floor; externally a 'fluffy' mineral wool insulation in 'sausages', plasterboard and breather membrane. The thermoplastic breather membrane acts as a wrapping during delivery thus has a dual purpose. Once in position the wrapping is removed from the doors and windows and the corridor side of the pod. Externally battens are added as support for cladding – tiles at high level, brick lower down.

There does not appear to be any horizontal separation in addition to the pods. The manufacturers 'Tilden' have been contacted and general sales information was sent to FRS, Figure 3.1.3.37.

The bathrooms have the outer corner cut off in order to form a continuous vertical triangular service duct with the adjacent pod and the access corridor, Figure 3.1.3.38. There are doors to this duct on each floor. Hard wired smoke alarms in each room. Some of the rooms have interconnecting doors to provide accommodation for a family. The hotel has been much extended and work started in May 1999 with the present wing started in November 1999 with completion due in May 2000. Security on site is strict, the pods are locked each night and access is made to complete the carpet fittings and finish off the installation of the detectors. There have been no reported cases of vandalism or theft until this incident. The original part of the hotel is still in use. At night there are usually two staff on duty.

The fire

Fire suspected to have been deliberately started in a bedroom on the first floor. The window is believed to have been broken which would have assisted the development of the fire – the weather was very windy and wet. Fire may have been burning in excess of half an hour before discovery.

The fire spread both up and down from the room of origin with some lateral spread via the interconnecting doors, Figure 3.1.3.39. Fire also reached the roof. In all nine pods are fire damaged with damage to ceilings and floors from fire brigade activity to trace the spread of the fire.

Spread of smoke

Fortunately smoke spread out of the building and into a neighbouring wing, through an open window where it triggered the smoke alarm. Smoke spread throughout the three storey extension. Some smoke staining in the service ducts but no fire penetration of the duct at all, Figure 3.1.3.40.

Injuries
None. All the hotel guests in the adjacent wings were evacuated safely.

Implications for Building Regulations

Compartmentation appears to be achieved by the effects of gravity holding the pods in place which are built to a high standard and should provide one hour fire resistance. The service duct to the bathrooms is continuous through all three floors but was not breached by the fire.

The provision of means of escape appears adequate. However, it is worth noting that of the two people expected as night staff only one was present due to illness. The single on-duty staff member did not immediately respond to the alarm. The evacuation was initiated by the police and fire brigade. Hayes Fire Station immediately adjacent to the new extension so fire fighters were able to confirm the presence of the fire very easily.

Comments

The performance of the thermoplastic breather membrane/wrapping afforded a route for the fire to spread both up and down the building. Heavier duty insulation may delay fire reaching the membrane.

During construction temporary rate of rise alarms may afford earlier warning of fire. With the increasing use of pod systems we expect more fires during use, guests' luggage may be a contributory factor, we are concerned about the unexpected spread out of the room of origin once the walls and ceiling are breached. In addition the pod system is planned for domestic build with the much higher risk of cooking fires. The implications of this late discovery fire may have benefits for pod design and use in the future. To this effect an outline project proposal has been made to DETR to explore the potential problem before there is any life loss associated with these 'pre-engineered' buildings.

Figure 3.1.3.35 Extension under construction

Figure 3.1.3.36 Rooms come fully furnished, this corner is undamaged

Figure 3.1.3.37 Information from Tilden, showing steel frame

Figure 3.1.3.38 Triangular services shaft for adjoining bathrooms

Figure 3.1.3.39 Fire damage in the room of fire origin

Figure 3.1.3.40 Fire damage in the adjacent room

3.1.4 GROUP 4 – DWELLINGS

Brentvale Avenue, Alperton, Middx, 23 May 1999 (LFCDA)

FRS received brief details of this fatal fire where one person was found dead on a Sunday morning after a call to the brigade at 10.48 h. The fire had involved two single mattresses made from slabs of polyurethane foam and a home-made cover of cotton polymer mix. The mattress had an aggregate volume of 0.78 m^3.

Terrace house fire in Harlington, 12 October 1999 (LFCDA)

Information on this fire reached FRS because of a shared interest in problems arising from the performance of add-on roofs. In this case a flat-roofed terrace of two-storey houses was refurbished with the addition of a pitched roof of timber and tile construction. Internally there were cavity barriers of mineral wool, chicken wire, stud and 3/8 plywood, air gap and then plywood on stud, chicken wire and mineral wool. The barriers went up to the roofing felt which was linked across all the terrace. There was no access to the roof from the properties below. The ridge tiles were however, not cemented together so smoke was able to trickle out unnoticed by the brigade.

The brigade was called to a fire in one of the middle properties. Fire fighters checked for fire either side having put the original fire out and left at 04.00 h. At 6.07 h it was noticed that the roof next door was alight.

It transpired that the original fire had spread up into the roof space via the eaves soffit and had got into the purlins and joists via the air gap in the cavity barriers. The timber used was glulam, where seven pieces of 2 x 2½ timber are glued together and then fitted with metal plates to allow bolting together of the purlins. Once the fire reached the roof timbers the bonding agents used broke down and allowed the fire to develop in the purlins and joists. From tests on glulam beams witnessed at BRE by the author, this would have been a lengthy process and may explain why it was two hours before the subsequent fire was discovered.

Thatch fire, Flitton, Beds, 5 November 1999 FSIS Ref 16/99

Befordshire Fire and Rescue kindly provided a few details of this fire. Fire was discovered and the brigade called at 18.16 h when something was seen alight on the roof of this one and two-storey house. The thatched roof was at least fifty years old. The fire

spread very quickly, probably wind assisted. The retained crew arrived ten minutes after the call and were able to confine the fire to the loft and a first floor bedroom and part of a second bedroom.

The fire was believed to have been caused by a firework.

While there are no direct implications for Building Regulations, this fire has been included as there are still concerns about the behaviour of thatched roofs in fires. It may be of interest to mention that at the time of writing (July 2000) the Chief and Assistant Chief Fire Officers Association (CACFOA) is starting to look a national approach to fighting fires in thatch.

Fatal fire in Nottingham 10 November 1999 (Nottinghamshire Fire and Rescue) FSIS Ref 16/99

ADO Ian Tomalin called from the scene very concerned about the sitting-room ceiling which he thought to be polystyrene. He was investigating a fire to which the brigade had been called at 12.49 h. Penny Morgan attended the scene the next day having discussed the fire with ADO Ian Tomalin, ADO John Topham, Deputy Chief Fire Officer Trevor Newton and Deputy Chief Fire Officer Brian Taylor at brigade headquarters.

The building

This was a 1970 flat-roofed town house, one of a pair of semis in a staggered terrace of four pairs, Figure 3.1.4.1. Construction is rationalised traditional with blockwork party walls; internal partitions of stud and timber board. Three bedrooms with ¾" close boarded chipboard floors on 4" wooden joists. The ceiling in the through sitting room/diner appears to consist of Plaschem ie polyurethane board which is paper faced on both sides, the lower one painted with artex perhaps containing asbestos*, below that was a paper that resembles a waxed paper breather membrane and finally a painted ceiling paper. The kitchen ceiling appeared to be just the Plaschem.

A smoke detector had been recently provided by the brigade but not fitted. It was on a shelf in the hall.

The fire

It is likely that smoker's materials ignited the armchair the elderly lady occupant was sitting in. The chair was filled with polyester fibre and polyurethane foam on the arms, and had an additional feather filled cushion, Figure 3.1.4.2. There was a cotton cover and cotton interliner.

* Tests were done on samples and no asbestos was found.

There appears to have been a vitiated fire indicated by heavy yellow staining on the windows, Figure 3.1.4.3. It was this staining that alerted her care worker, who lives next door to call the fire brigade.

The ceiling material above the chair had burned through,Figure 3.1.4.4 and hot gases spread over partition wall into the hall where part of that ceiling had burned through. One of the joists was charred, others blackened; smoke staining was clear on the underside of the chipboard and charring of the carpet above on the chipboard butt joint lines in two bedrooms. Doors to the fire room were closed; back draft occurred on entry of the fire fighters who had the information that there were 'persons reported'

Smoke spread up the stairs from the hall ceiling, Figure 3.1.4.5 and through the floor into the small back bedroom.

Injuries

The 87 year old resident died.

Implications for Building Regulations

Although compartmentation and means of escape were perfectly adequate there are concerns about the Plaschem ceiling. . Tony Morris tells me that Plaschem was widely used at that time when plasterboard was scarce – he pointed out that the floor/ceiling assembly is unlikely to achieve the modified half hour fire resistance that the 1965 Building Regulations would have required. FRS was involved in investigating the performance of Plaschem ceilings used in bungalows in the 1970s. We did not, however, investigate Plaschem used in ground floor ceilings.

We did report on a fire in Greenham in 1990 (FSIS Ref 31/90) where Plaschem was used for the bedroom ceilings. In that case the fatalities had occurred before the Plaschem was involved.

Comments

Brigade will be checking their records of fires on the estate to see if there have been any cases of unusual spread from floor to floor not involving the staircase. Deputy Chief Fire Officer Taylor is trying to find out what the original specifications were for the houses.

Figure 3.1.4.1 External view of the house

Figure 3.1.4.2 The chair the fatality had been sitting in

Figure 3.1.4.3 Heavy smoke staining on the windows indicative of a vitiated fire

Figure 3.1.4.4 Damage to the ceiling above the fire

Figure 3.1.4.5 Damage at the top of the stairs from hot smoke

Timber-frame terrace of houses in Basingstoke 12 December 1999

Occasionally concerns are raised by the media about the fire performance of specific building types. Meridian Television contacted the Press office at BRE for comments about a fire in a terrace of timber-frame houses built in the 1970s.

The reporter Mary Stanley, had been 'told by the fire service they are timber framed buildings with timber lining and plaster board. The outside seems to have a white plastic covering, with a small amount of brick at the bottom. The fire started after a man who was repairing the petrol tank of his motorbike lit a gas fire to keep warm. It quickly spread through the terrace of five houses which re all due to be demolished tomorrow. Do you

recognise these from the description* and is there any concern about them?' Ms Stanley kindly faxed photographs to BRE. Unfortunately, they are too poor to be useful.

ADO Cooke informed me that there were two issues raised by the fire:

1. the man mending his motorbike was probably running a business from his garage. This suggestion may be supported by the presence cylinders of propane, acetylene, oxygen and argon. It is believed that the owner lit a propane flame to check for a petrol leak. There was a bang and he suffered flash burns

2. because the fire brigade are using more defensive tactics the five properties occupying some 30m were evacuated as were surrounding properties up to 100 m away. Then the brigade then started to fight the already well-established fire

3. the brigade had already issued a press release on the fire.

* FRS did investigate a fire in three-storey timber-frame flats in Basingstoke in May 1996. In that case a deliberate fire was started outside the entrance in bags of rubbish. The fire spread into the building via a plywood detail and into the wall cavities to the roof.

Brownfield street, Poplar, London, 6 March 2000 (LFCDA)

The fire brigade were called to a fire in a second floor maisonette at 10.95 h where fire spread up the internal stairs to the third floor. The fire started in the lounge. The brigade had difficulty in getting into the premises as there was a locked metal grille on the front door as well as several door locks.

The elderly woman occupant aged 75 years was found behind the front door, rescued but later pronounced dead. The fire had spread to the front door by means of a piped oxygen supply in the flat for medical reasons. No smoke alarm was found.

Fire fighter injured in fire in flat, Kendale Road, Bromley, 6 March 2000 (LFCDA)

Fire fighters were called to a fire in a flat in a two-storey purpose-built block at 18.13 h. One fire fighter was taken to hospital with burns to hands and legs as the result of a backdraft.

The fire was confined to the lounge area of the flat although smoke had travelled unchecked through the communal roof void. Entry to the premises was hindered by the installation of a steel security door. Police were dealing with the cause of fire.

These incident outlines have been passed to those dealing with the project on 'Means of escape and security'. Similarly, information on a fatal fire in Kent where two people died because they were overcome by smoke before they could open both Chubb door locks has also been passed to those working on the 'means of escape and security' project.

These cases highlight the potential life risk presented by extra security measures that may prevent the occupants from leaving safely or prevent the brigade getting in and rescuing them. This is a particular and separate issue for Building Regulations to consider.

3.1.5 GROUP 5 – PUBLIC ASSSEMBLY/ENTERTAINMENT

Thamesview Youth Club, Barking, 7 September 1999 (LFCDA)

The investigating officer forwarded an outline of this fire for in formation. The building had an entertainment license issued by the local authority. Part of the construction was a large glazed area with PVCu frame. The roof was mainly of strawboard construction which had been weather sealed with bitumen. The bitumen layer had been repaired several times over a number of years as the roof had been leaky.

The brigade were called to a fire in the empty building at 01.22 h and one crew found that the fire developed so rapidly they had to make an equally rapid exit leaving their equipment behind.

This is an example of inappropriate use of materials for refurbishment purposes.

Austrian disco fires 23 October 1999

Press reports on two disco fires were followed up by requests for information from local investigators.

From the BBC webpage it was reported that " More than 80 young people have been injured in two separate disco fires in Austria. Both discos were holding so-called polystyrene parties, where people dance ankle-deep in supposedly fireproof polystyrene. The most serious fire – in the village of St Agatha near Bad Goisern in the northwest – is believed to have broken out after one of the teenagers dropped a cigarette setting the polystyrene alight. A least 70 people were taken to hospital from the Joy disco. It took firefighters 2 hours to being the blaze under control. The second fire was at a smaller nightspot in Obendorf, 10 miles north of Salzburg on the German border, with at least ten people reported injured."

The British Plastics Federation sent out advise to its members who produce EPS on how to deal with press enquiries.

Ing Christian Lebeda of the Vienna University of Technology, Fire Research Group reported to the International Association of Fire Safety Science that "According to newer investigations the reason of the fire was arson by a guest. A young man was arrested.. he has 'tested' the flammability of the chips with a lighter. We have performed some small-scale tests with samples of filling materials of polystyrene (maybe they are not the same as used in the disco). It was very hard to ignite the chips with a lighter, because the chips melted and dropped down. We need maybe 20 attempts to ignite a layer of chips one at a time. But if we use only ca 1 ml of isopropanol (we use one three drops!!!) on one chip we ignite the layer very easily and have a fast fire spread. Maybe the same effect will take place with spirits with a high content of ethanol."

This is not a scenario we intend to try and simulate for the work on design fires in the 'Characterisation of fires for design purposes' project' !

3.1.6 GROUP 6 – OTHER AND MISCELLANEOUS

Car park fire in Newcastle 1 April 1998 (Tyne and Wear Fire Brigade)

I am indebted to Station Officer Nielsen for copies of photographs of an open air car park fire where the fire in the BMW spread to three other cars, see below.

Car park fire at Gatwick Airport 27 July 1999 (Surrey Fire Brigade)

Following press reports the following details emerged from Surrey control about the fire at Church Lane, Burstow, Surrey. 'At 15.45 h, the fire brigade was called to a fire in large quantity of pallets in a compound immediately adjacent to a 500 space car park.' The car park was for long stay parking for air passengers at Gatwick Airport. Cars were parked in rows from close to the metal fence separating the two areas.

The pallets were in an area 85m x 40m up to 9m and 2m away from open metal fencing. There was a 4m gap between the piles of pallets.

Malcolm Styles of Surrey Fire Brigade added some more information. The pallet compound faced north and in the north-east corner there were pits measuring 3m x 3m and 1m deep where barrel loads of pallet offcuts were placed and then burned. The work stopped at lunch time. BY 15.30 h work was going on in the north-west corner of the pallet store when staff in the car park noticed smoke and flames coming from the pallets. They moved the second row of cars and when going back to the third row found the heat too intense. Next burning brands spread to other cars and the whole car park appeared alight. The workmen in the pallet yard noticed the fire and called the brigade at 15.45 h to come to the perimeter fence where the cars were parked.

There were 75 lines of parked cars. A fire break was created by moving the cars from lines 59 and 60. The heat from the burning cars was very intense and even at 20.00 h brigade crews could not walk across the pallet yard as the ground was too hot.

A North Easterly wind was moving at 17mph which contributed to the spread of fire.

Fifty four cars were severely damaged; a further 61 were damaged to varying degrees by flying brands, heat and smoke.

Fire and explosion investigations in Russia

Dr Igor S Taubkin

Notes based on a talk given at LFCDA Headquartes 14 October 1999

Dr Taubkin works for the Ministry of Justice of the Russian Federation as head of the Central federal Unit for the Forensic Investigation of Fire and Explosions. He is also head of the Science Research Establishment for fire and explosions and is thus a representative of Internal Affairs and their research laboratories and law enforcement agencies.

He started by giving a broad overview of Russian Statistics going on to investigations of a few specific fires and then took questions from the floor. On 9 February 1999 there was a parliamentary hearing into systems of fire and fire occurrences in Russia as a whole, From the evidence from the Head of the Fire Service there are approximately 300, 000 fires annually with 123, 000 in occupied buildings. Actual numbers go from 328, 000 in 1993 to 266, 000 in 1998. The living space for about half a million people is destroyed

each year with 700 fires a day and 300 buildings destroyed or damaged by fire. This represents about 1% of the GDP.

Fatalities and injuries

There is a total population of around 140 million in Russia. That means about 2.6 times the population of the UK. The figures for the last three years are:

deaths 15,750 in 1996

13,782 in 1997

13,600 in 1998

injuries average about 15,000 per year.

This implies that Russian life losses in fire per capita are about ten times ours in the UK.

Their large life loss fires tend to kill large numbers of people. In 1977 there was the first fire in a high rise hotel in Russia. 43 people died. In 1991 a hotel fire in St Petersburg caused 23 fatalities including 8 fire fighters. In 1993 a trolley bus fire caused 16 fatalities and 20 serious injuries.

On 10 February 1994 in the City of Samara 57 fit, healthy, young adults died and a further 180 casualties resulted from a daytime fire in Police Headquarters. This was an L-shaped five storey building, 50 m wide. There were escape stairs at each end of the 'L' and a central common staircase in the corner of the 'L'. Fire doors with closers to the escape stairs were fitted. Smokers' materials ignited the contents of a wastebasket and the subsequent fire smoke logged the entire building in 5-7 min. Smoke alarms were fitted throughout.

Although there are plenty of suitable regulations in Russia for all types of buildings as well a s guidance on how to upgrade them, they are largely ignored. There is no enforcement as there are insufficient resources.

Standard fire fighting commands no respect which has led to great emphasis on first aid fire fighting. People do not trust them to come or do the right thing. This results in huge losses of property like the recent fir in the Ministry of Transport where a small fire got out of control and destroyed most of the building. Timber partitioning aided the spread of the fire.

The most common cause of fire is smoking while drunk which then tends to highlight the breaches in fire safety in the building. Another common source of fire is caused by the street supply of LPG for domestic use – the cylinders have nuts to close them but no signs of pressure relief valves. (This led to a long discussion in Russian about what PRVs are and what they do – it appeared to be a novel concept) A recent example earlier in

October occurred in a flat where the resident bred tropical fish in his flat tried to raise the temperature was using an LPG heater, blew his flat up and the ones on the floors above and below.

Dr Taubkin was also involved in investigating the recent terrorist bombings in Moscow where devices were set in the basements of buildings and once the population started to check these areas the bombs were placed in cars.

He visited FRS the next day and later supplied us with information on a diesel fire following a collision between two trains. He pointed out that had the Paddington fire occurred in Moscow he would have been doing the investigation personally. He would also lead the enquiry as it is his office that advises government on future controls etc. In Russia there would not be a third party to lead a Public Enquiry.

Fireworks cause roof fire in Copenhagen, 5 January 2000

FRS received a translation of a press report of a roof fire at the corner of Taasingegade and Østerbrogade in Copenhagen.

The alarm sounded at 00.27 h and the brigade arrived six minutes later. One hundred people were evacuated including the Mayor. The fire developed rapidly but did not penetrate the building because of the40 mm of mineral wool insulation between the attic and the apartments below. Witnesses had seen a rocket land and explode on the roof just before the fire started.

There was no fire damage to the flats but some water damage was sustained. The report was forwarded to FRS by the manufacturer of the mineral wool insulation.

General enquiries

Part of the networking has been the exchange of information, particularly with brigades. Where relevant the information is included if there are implications for Building Regulations. Often there are no such implications but it may be useful to sketch out the range of topics covered which do provide an insight into human behaviour.

The distances that petrol vapour can travel have figured in two cases. In the first , a fatal fire in a scrap yard dealing with cars, petrol vapour travelled from a scrap car to a poorly maintained yard crane which was running hot. As scrap cars have very little value there is often more money to be made from the petrol remaining in the tanks. This was syphoned out before cutting up the bodywork. At the end of a long, still, hot day conditions were just right to ignite a low level pool of vapour. One man died.

In the second a man was doing up a property in his spare time before moving in. Petrol vapour blew out the windows and walls of the house. The owner had been working in the

kitchen and before he left had been trying to tidy up the site. He'd opened the side door and removed oily waste (petrol and diesel) stored from the digger and chain saw he'd used outside. He had then tried to burn it in the garden. He had returned to the kitchen had a cigarette and a cup of coffee, then left at about 18.50 h. At 20.30 h the explosion occurred in the corner diagonally opposite the side door. The only materials present had been his kettle and some empty kitchen units. The likely explanation was that vapour had travelled across the kitchen and been ignited by careless disposal of smoker's materials.

FRS was also contacted by Northumberland Fire and Rescue service seeking to establish why a Yucca plant had 'caught fire in a bedroom', see cutting. Self-heating and ignition by a discarded cigarette of dry peat were discussed briefly.

4 DISSEMINATION AND EXPLOITATION OF RESULTS

The DETR client has been kept informed of those fires with immediate implications and/or where there is a need to brief ministers about a high profile event. The County Mall car park was one such incident where the received wisdom of fires never spreading beyond the original vehicle was overturned by the event as five cars were damaged.

Information has been shared with other investigators in an informal way on a regular basis. Dissemination of findings has been made to interested parties such as the attendees at the session 'Lessons from real fires' as part of the CPD programme run by the Mid Career College.

5 DISCUSSION AND POLICY IMPLICATIONS

In one of the summaries above, Lucas Court, it was pointed out that there were no implications for Building Regulations as the continuing control option has never been exercised. The provision of a safe escape route therefore lies with the building owners and users. But there is a very real concern here, which is most easily expressed as one of 'how does one explain a serious injury of death from smoke inhalation that might occur in a future fire? – *knowing* the history of fire in the block.' This building is not subject to the Fire Precautions Act and there is no legislative control on its constructional elements once the building is in use. The Workplace Regulations will impact on a wide range of buildings but are still unlikely to affect this type of occupancy.

Avoidable fires will always happen as the result of either an act or omission. The saddest case reported is the death of a woman and her son from inhaling the products of combustion of charred food. There was no smoke alarm so both slid into unconsciousness and died. In the examples of the two lunchtime fires in HMOs , smoke alarms alerted those present and safe evacuations were made. The late evening cooking pot fire in the third HMO example shows how effective even a poorly functioning alarm system can be. In terms of life safety the avoidance of death by the provision of a working detector cannot be overemphasised.

Add on roofs continue to offer new problems

General problem of refurbishment and the consequences of choices of materials and their specification, most notably in Irvine. The choice of materials based on cost considerations and/or time constraints such as when materials are available can lead to disastrous choices. Guidance as to the long term effects of such choices as well as the implications during the actual refurbishment process could be beneficial to the construction industry, building owners and users.

Specific incidents have raised the continuing concern of the difficulty in escaping from domestic premises with high level security provisions. This information has been passed to colleagues working on the MOE and security project.

Pre-engineered or pod buildings are identified as meriting further study. The pre-assembled rooms are of steel frame design with mineral wool insulation, plasterboard and chipboard lining. They arrive on site wrapped in a breather membrane that acts as packaging during transport. In the Comfort Inn fire this membrane afforded a route for fire spread. While accepting that the particular circumstances are unlikely to be repeated if the system is used for domestic accommodation there is a more obvious risk associated with kitchens.

Extract duct fires are being addressed by the insurance industry and others with concerns about property protection. While the risk to life is low it is nevertheless a real one and the topic should have support even if it is only tacit.

6 CONCLUSION AND RECOMMENDATIONS

- The programme of fire investigation on behalf of the DETR will continue to report on a range of fires as they occur in order to provide timely and appropriate briefings for ministers and policy makers.
- The network of contacts will be maintained and extended as opportunity arises.
- The main recommendation is for consideration of guidance on potential problems arising from poor specification and material choices in refurbishments.
- Pre-engineered or pod buildings should be examined for potential risk to life from unusual fire spread
- Experience from real fire investigations should continue to be used to bring realism to experimental work supported by the Department in fire areas as well as assisting in identifying future areas for study.

Annex 1 – List of previous reports, with references, for this project

BRE output/ milestone reference	Title	Date submitted
Client Report CR394/98	Investigation of real fires April 1997 to March 1998	October 1997
Output 76571/5	Investigation of real fires April 1998 to March 1999	September 1999