



tenos

▼ REPORT INTO A FIRE AT THE SUFFOLK
FOOD HALL ON 27 JANUARY 2010

TS10124-R01

for:
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THE INDEPENDENT FIRE SAFETY ENGINEERING CONSULTANTS

Issue and amendment record

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Important information

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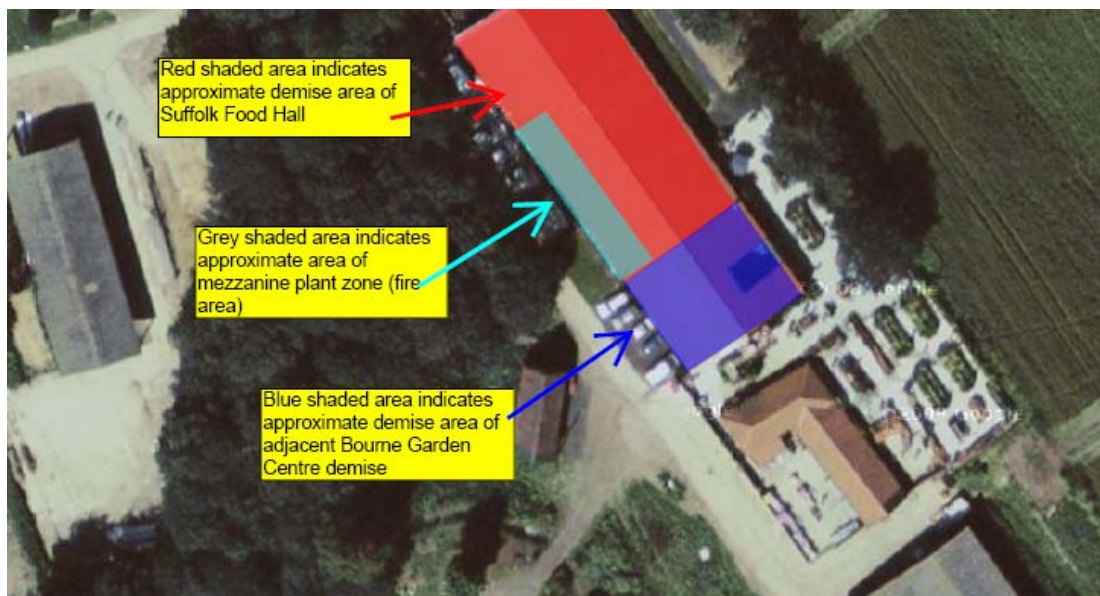
1 Introduction

- 1.1 A fire occurred at The Suffolk Food Hall, Ipswich on 27th January 2010.
- 1.2 Kingspan Ltd instructed Tenos Ltd to examine the building to determine the behaviour of any Kingspan products in the structure during the fire.
- 1.3 M Bullock of Tenos Ltd visited the building on 3rd February 2010 and performed an inspection of the fire affected area. During the visit, M Bullock had the opportunity to discuss the events of 27th January with one of the proprietors, Oliver Paul.

2 Brief description of the building

- 2.1 The building is located at Wherstead, Ipswich and it is understood (from a discussion on site with Mr Oliver Paul) that the building is a conversion of an existing farm building.
- 2.2 On plan the building measures approximately 20m (from west to east) by 60m (from north to south) with a height to roof apex of approximately 6m.
- 2.3 The building is occupied by two tenants, The Suffolk Food Hall (to the north) and Bourne Garden Centre (to the south). Communication between the two tenancies is provided at ground level by a single door opening. The area occupied by The Suffolk Food Hall measures approximately 800m² in plan.
- 2.4 Figure 1 shows a satellite image (from Google Maps) of the building.
- 2.5 The figure is marked up to show the extent of accommodation allocated to each of the two tenancies and the area of fire origin.

Figure 1 - Plan of building marked up to show location of tenant demises and fire area



- 2.6 The main building consists of a pitch pine timber frame structure with additional softwood roof purlins flitched to the existing roof purlins to reinforce the roof structure to support a roof membrane comprising Kingspan insulated panels (KS1000 RW) with a core of PIR (Polyisocyanurate).

- 2.7 Where the fire service had cut a hole through the external wall construction for venting purposes, it appears that the external wall comprises steel skinned sandwich panels with a glass fibre insulation infill (i.e. sandwich panels incorporating foamed plastic insulation have not been used in the external wall construction).
- 2.8 Internal walls in the building appear to have been provided in timber frame construction with plasterboard cladding.
- 2.9 At the western side of the Suffolk Food Hall, the ground floor accommodation includes freezers/chillers, forward office and back of house amenity accommodation. At mezzanine level over this accommodation is located Mechanical and Electrical plant and services. A bulkhead wall at this level separates the services area from the remainder of the mezzanine. The mezzanine also provides an access landing to the plant room and a customer restaurant. The bulkhead separates the M&E services area from the main full height retail volume. However, the bulkhead is not continuous for the full length of the building and therefore would not have provided fire compartmentation between the M&E area and sales space.

3 The Fire

- 3.1 From statements made by Oliver Paul during the site visit on 3 February, it is understood that the fire started at about 0500hrs on 27 January, at a time when the on-site baker was in the premises. He stated that it was suspected that the fire started in either the electrical distribution equipment fixed to the plant room side of the bulkhead wall described in section 2.9 or in water heating equipment provided in the mezzanine plant area.
- 3.2 Oliver Paul stated that the fire was detected by the automatic fire detection system and that a manual call was placed to the fire brigade by the on-site baker as a response to the resulting alarm signal.
- 3.3 It is understood that all persons safely evacuated the building without injury.
- 3.4 Oliver Paul stated that the fire service was on site by 0530hrs and had brought the fire under control by 0600hrs.
- 3.5 Oliver Paul stated that the Fire Fighter in charge (Geoff Pyke) expressed concerns on attendance in respect of the presence of foamed plastic cored sandwich panels in the external envelope of the building and referred to previous problems that he had experienced in fighting fires in buildings where foamed plastic cored panels had been used.
- 3.6 However, Oliver Paul went on to say that Geoff Pyke had expressed the view that he was impressed with the good performance of the sandwich panel roof construction in this fire.
- 3.7 Attempts have been made by Tenos to contact Geoff Pyke by email and telephone for specific comment but it has not been possible to establish contact.
- 3.8 Press reports published on BBC and East Anglian Daily Times (EADT) web sites have quoted statements made by Geoff Pyke and these are shown in Figure 2 and Figure 3. They clearly reinforce the statements made by Oliver Paul relating to the Fire Service view of the performance of the sandwich panel construction in the fire.

Figure 2 – quote taken from BBC web site news item

Jeff Pike from Suffolk Fire and Rescue said: "When we arrived with one appliance we immediately called for back up and four more arrived.

"We brought it under control quickly but we were afraid the foam insulation may have caught fire or melted so we waited to inspect that before ventilating the building which contained a lot of smoke."

Figure 3 – quote taken from East Anglian Daily Times web site news item

Firefighter Geoff Pyke, who is group manager and Ipswich district commander, described the blaze as severe, but praised the insulation in the roof for the fire not being able to spread.

Mr Pyke said: "When we arrived the place was percolating smoke from all the openings on the roof. We tried to ventilate the building by opening all the apertures."

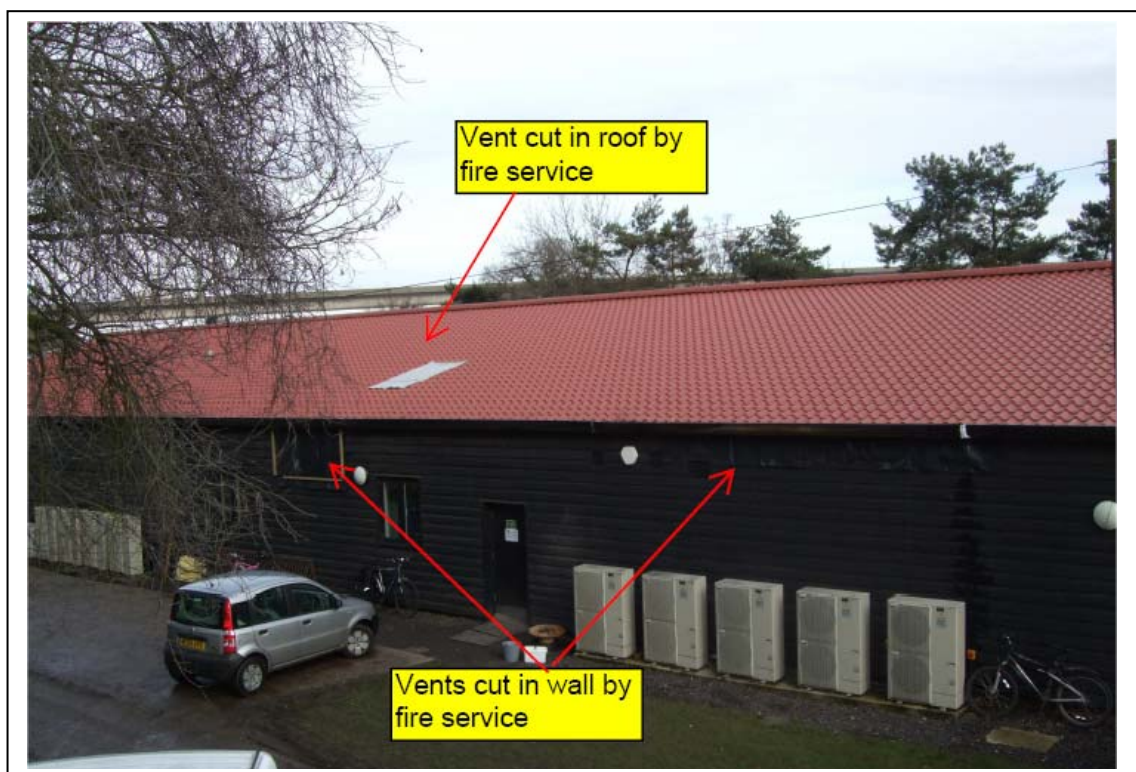
Firefighters were concerned the fire could ignite the foam insulation in the roof, which was tightly sandwiched between two sheets of metal.

However, Mr Pyke said that although they had to rip into the sheets of metal from the top and bottom, the quality of the foam meant the heat had not caused it to ignite. Had it done so the roof would probably have been destroyed and the building significantly damaged.

Mr Pyke said: "We can only assume the foam in the roof was of a fire retardant nature and withstood the fire."

3.9 Oliver Paul reported that the fire service took the decision early in the fire-fighting intervention to create an opening through the roof membrane to ventilate the fire location. By virtue of it being a frosty morning, the fire service decided to create a vent in the location where it appeared that the fire intensity was greatest due to fire-induced thawing of frost on the upper surface of the roof in this location. The location of this roof vent is marked up on the photograph shown in Figure 4. The fire service also cut vents in the external wall at the locations shown. The left-most wall vent was into the mezzanine plant area at low level.

Figure 4 - photograph showing vents created by fire service.



3.10 It is understood that the building was back in operation by the weekend following the fire. Work to re-instate the building had included replacement of essential services and extensive cleaning to remove smoke deposits from the building surfaces in the sales area.

4 The site investigation

- 4.1 This section lists the key observations from the site investigation carried out by M Bullock on 3rd February.
- 4.2 The mezzanine plant area was accessed through a doorway at the top of an open accommodation stair leading to the 1st floor cafe area.
- 4.3 It was evident that some of the services in the fire affected area had already been replaced in order to reinstate the business function, although some fire damaged equipment and materials remained in the area.
- 4.4 Figure 5 shows a photograph taken in the mezzanine plant area looking down the slope of the pitched roofline towards the internal face of the western external wall. The extent of the hot smoke layer development can be seen by the height at which the internal face of the external wall is smoke stained above deck level.

Figure 5 – view of fire damaged area looking down towards the eaves



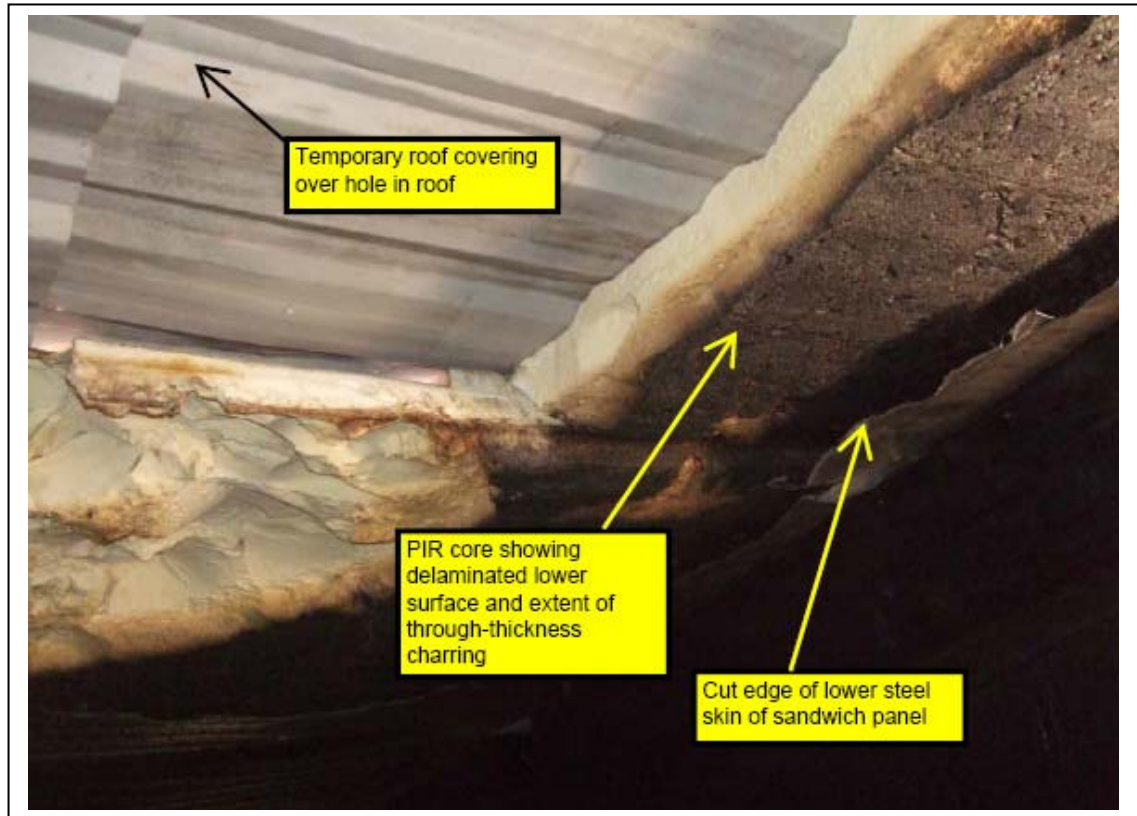
- 4.5 It was evident that combustible materials at low level had not become generally involved in the fire, therefore indicating that the fire had remained in a fuel bed controlled state and had not flashed over and become ventilation controlled.
- 4.6 However, significant involvement in the fire of combustible services and timber structure at high level positions was clearly evident.

- 4.7 The position where charring of roof support timbers was most significant was approximately 2.7m to the south of the vent that the fire service cut through the roof membrane. At this location, the depth of charring to the main timber rafter was approximately 15mm. Figure 6 shows a photograph of a charred roof support portal at this location.

Figure 6 – charring of roof support portal at position of maximum fire intensity



- 4.8 Based on softwood exhibiting a charring rate of approximately 20mm per half hour of exposure to the conditions of a standard fire resistance test, this indicates that the fire exposure to which the roof had been subjected was approximately equivalent to a 23 minute fire resistance test
- 4.9 At the location where the fire service had created the roof vent, it could be ascertained from the visual inspection that the fire exposure had resulted in partial through-thickness charring of the PIR core material of the roof membrane sandwich panels. Figure 7 shows a photograph of the core material close to the location where the fire had been most intense.
- 4.10 Whilst the PIR core was charred through part of its thickness, there was no evidence to suggest that the fire had been propagated through the insulating material core of the panel.

Figure 7 – charring of sandwich panel PIR core

- 4.11 It was established that the lower skin of the roof membrane sandwich panels had delaminated from the PIR core over the parts of the mezzanine area that had been subject to the greatest fire intensity. This delamination was evident wherever there was evidence of charring of roof timbers. The further north along the mezzanine area, the lesser was the fire intensity and, at a point over the ground level chillers, it was apparent that the roof membrane from this point to the northern extremity of the building was not delaminated. Figure 8 shows a photograph of the roof looking northwards from the plant mezzanine area. Although the timbers have been stained by hot smoke, there was no evidence of penetrative charring of the roof timbers in this area.
- 4.12 Figure 9 shows a photograph of smoke stained timbers in this area where new electrical services have been replaced and where previous PVC cable fixings had melted. At this location the lower skin of the roof membrane exhibited delamination from the core.

Figure 8 – view looking from the plant mezzanine level towards north wall



Figure 9 – melted cable clip on smoke stained timber



- 4.13 Figure 10 shows a view from mezzanine level of the plasterboard clad wall running north to south between the plant mezzanine area (to the left of the wall) and the main retail space (to the right). The photograph illustrates that the fire did not spread to the retail space through this wall, albeit there was evidence of smoke penetration through unsealed gaps.

Figure10 – wall between mezzanine plant area and main sales space



- 4.14 Figure 11 shows a photograph taken from inside the adjacent Bourne Garden Centre demise looking up at the underside of the roof cladding at the south western corner of the wall to the mezzanine plant area.

Figure11 - photograph of underside of roof in adjacent demise



- 4.15 The photograph shows evidence of smoke penetration through gaps and also indicates that the fire did not spread along timber roof support members or services passing through this wall.

5 Conclusions

5.1 The following conclusions can be drawn from the site inspection:

- ▶ The fire was sufficiently intense to have subjected the roof membrane and wall separating the plant area from the retail space to a level of exposure equivalent to approximately 20-25 minutes in a standard fire resistance test.
- ▶ Fire spread did not occur from the mezzanine plant area to the rest of the building.
- ▶ The PIR core material of the roof sandwich panels did not transmit fire from one side of the walls enclosing the plant area to the other.

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