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Ref: 45/4/30

Note: The following letter which has had personal details edited out was issued by our former department, the Office of the Deputy Prime Minister (ODPM). ODPM became Communities and Local Government on 5 May 2006 - all references in the text to ODPM now refer to Communities and Local Government.

Greater Manchester Act 1981: Section 65 (Fire precautions in large storage buildings)

Appeal under sub-section 65(6) against a decision by the Borough Council to reject plans for building work to provide a stand alone smoke ventilation system in a warehouse building

The appeal

3. Section 65 of the 1981 Act (Fire precautions in large storage buildings) relates to buildings for storing or depositing goods or materials where more than 7,000m^3 of the volume of the building will be so used. Sub-section 65(2) provides that where plans are deposited in accordance with the building regulations for the proposed construction, extension or alteration of a building, or the change of use of a building to which section 65 applies, then a district council shall reject the plans unless they are satisfied, having consulted the fire authority, that they may properly give unconditional consent or give consent conditionally in respect of the matters contained in sub-section 65(3) of the 1981 Act. The matters contained in sub-section 65(3) relate to measures to prevent the outbreak or spread of fire in or from the building or to reducing the danger from fire in the building.

4. Sub-section 65(6) of the 1981 Act provides that a person who is aggrieved by the action of a district council which has rejected plans, or imposed conditions, may appeal to the Secretary of State.

The building work

5. The building to which this appeal relates is a warehouse approximately 40m x 66m in plan area with a cubic volume of 25,000m^3. It was originally built as a speculative building under the auspices of the Building Regulations 1991. The building construction is steel frame onto which lightweight profile steel sheeting is fixed to form the walls and roof, which has low melting point roof lights in 10 per cent of the roof area. There is a 2m high breezeblock wall built internally around the perimeter of the warehouse. The building is detached and in your view provides no fire risk to other buildings.

6. The plans show an existing two storey block (approximately 6.6m x 26m) of offices located internally along half of one of the longitudinal sides. The plans also show a proposed two storey extension (approximately 6m x 10m) to this accommodation, including a new internal stair.

7. The building was occupied by your client for the first time in April 2000, for the storage of metal components and use of the office accommodation. Following occupation a 9.2m high bay metal racking system was installed in the warehouse to maximum height within the roof profile. The racking has been provided to store metal components placed on plastic pallets, which are then stored with an assortment of cardboard boxes and wooden crates containing various types of packaging and filling. You consider that the percentage of combustible storage and packaging in the warehouse amounts to 15 per cent of the contents.

8. The Borough Council visited the warehouse shortly after installation of the racking, in connection with the extension indicated on the plan. They advised your client that, in addition to the requirements of the Building Regulations, the warehouse was subject to the fire safety requirements contained in section 65 of the 1981 Act. You subsequently deposited full plans applications, supported by a *Fire Safety Report*, which were rejected by the Borough Council on the grounds that your proposals did not demonstrate adequate provision for fire safety as required under section 65 of the 1981 Act.

9. The Borough Council originally advised you that in order to satisfy the requirements of the 1981 Act, the warehouse should either be divided into compartments no larger than 7000m^3 or an automatic in-rack sprinkler system should be installed. However, your client considered that to sub-divide the warehouse into small compartments would interfere with the function of the business and to install sprinklers would not be appropriate having regard to the contents of the warehouse. Furthermore, the insurers of the building also did not require sprinklers because of the high risk of water damage to the metal components. You therefore appealed to the Secretary of State against the Borough Council's decision to reject your plans.

The appellant's case

10. After carrying out an assessment of the building, on behalf of your client, you concluded that:

(i) the building is a relatively small warehouse unit with ancillary office accommodation

(ii) the construction of the building is low risk and requires no fire protection

(iii) the contents stored in the warehouse are metal, non-combustible and could also be considered as low risk

(iv) the only combustible contents in the warehouse are the ancillary containers and packaging, which you considered could be classed as medium risk

(v) there is a fire alarm and emergency lighting system installed throughout the warehouse and access to fire exits is available from wide gangways. The means of escape for employees in the warehouse is considered satisfactory.

In view of the above you took the view that the provision of an in rack sprinkler system was unnecessary for the protection of the building or its contents.

11. On the basis that a sprinkler system would not be provided, you then considered the implications of a fire occurring in the warehouse and whether the Fire Service would have difficulty in fighting the fire and whether their personnel would be put at risk whilst carrying out their duties. You again established the following points:

(i) access for fire appliances is satisfactory

(ii) there are ample access points available around the perimeter of the building

(iii) the roof is of lightweight construction and 10 per cent of the area consists of low melting point roof lights. In the event of a fire these roof lights would melt allowing the fire to ventilate

(iv) you considered that with the additional installation of an early warning system incorporating beam detectors linked to a remote monitoring station, attendance time would be improved and there would be no unusual risk to firefighters

(v) the early warning system coupled with the existing access and ventilation provisions would render the fire safety provision in the warehouse "reasonable and adequate".

12. However, the Borough Council considered that the use of low-melting point roof lights to provide venting was unacceptable and that if a stand alone smoke ventilation system was to be used, it would be necessary, in order to satisfy the 1981 Act to ensure in some other way that a flashover would not occur within a reasonable timeframe. This time period would need to be based on a realistic attendance time for the Fire Service. In order to expedite approval for the building work under the 1981 Act your client therefore requested that you develop an alternative fire engineering solution that satisfied this criterion.

13. You therefore designed, in conjunction with ... Engineering Services Ltd, a system of automatic smoke ventilators operated by a smoke detection system. The calculations using an established zone type computer fire model which you have provided, show that it would take 32 minutes for the smoke layer temperature to reach 550°c - the point at which flashover is assumed to occur.

14. However these calculations were based on an assumed medium fire growth rate (0.01172 kWs-2), whereas the Borough Council and the Fire Authority considered that an ultra-fast growth rate was more appropriate. In support of your case for using a medium fire growth rate you have made the following points:

(i) ultra-fast growth rates should only be used when all the storage items are combustible such as carpets or clothing

(ii) whilst not referring specifically to smoke *BS 5306: Part 2: 1990 (Fire extinguishing installations and equipment on premises. Specification for sprinkler systems)* does indicate that metal goods in cartons are classified as low risk

(iii) the use of the ultra-fast growth rate in the calculations is impractical because the scheme would only achieve an 8-9min time span before the building was smoke logged and the cost of the scheme would be doubled to approximately £60,000

(iv) in response to the Borough Council's concern about low water supplies within the area of the estate, you point out that it is the Fire Authority which is responsible for providing water for fire fighting purposes. You contend that the lack of water pressure in the area is the main motivation for the additional conditions being imposed on the building.

15. You maintain that the additional conditions requested by the Fire Authority are too onerous and inappropriate bearing in mind the size of the warehouse, the profile steel construction of the building and that the principal material being stored is metal components. You conclude that, in your view, your proposals satisfy the provisions which may be required under the 1981 Act.

16. You also subsequently responded to the Borough Council's representations to the Secretary of State reiterating much of your case and adding the following points:

(i) the pallets will be placed in several rows of racking throughout a 25000m^3 warehouse and it is therefore unlikely that they would all be involved in the initial stages of a fire. Moreover, the number of plastic pallets in the warehouse referred to by the Borough Council is grossly exaggerated - the actual figure being 1008

(ii) the term 'relatively small' is used in describing the warehouse in your fire safety report in comparison to other large storage buildings that are in use throughout the country. You have considered the purpose of section 65 of the 1981 Act and the issues of dangerous conditions for firefighters and fire losses. You point out that as the means of escape in the warehouse is satisfactory for employees the additional fire precautions are required for firefighters only. You therefore suggest that in your case no additional fire protection should be needed because: access is satisfactory for firefighters, there is no danger of the fire spreading to adjacent properties, the building is less than 27000m^3 capacity, and the insurance company are content to insure the building

(iii) with the advance of cheaper building materials it is sometimes a cheaper option for insurance companies to rebuild rather than protect the existing building and contents, as in your case. You conclude that the additional costs incurred for fire safety must be justified and that the Borough Council and the Fire Authority are being unreasonable bearing in mind the contents of the warehouse

(iv) if required you would be prepared to provide smoke curtains for the low melting point roof lights

(v) you regard the potential risk to firefighters as acceptable

(vi) you envisage that a competent fire alarm company would design the beam detectors to ensure that they operated successfully

(vii) the medium fire growth assessment is based on the building being predominantly metal in construction and that approximately 85 per cent of its contents are metal components. If packaging and palleting are seen to be the main fire risk then almost every building must be classified as an ultra- fast fire growth rate, which effectively means that alternative fire engineering solutions cannot be considered

(viii) while you accept that it is important to use a correct fire growth rate, you believe that other factors must also be considered when assessing the fire engineering strategy. In the *CIBSE Design Guide E Fire Engineering (Table 2)* warehouses are identified as 'Ultra-fast' with the proviso that this calculation "depends on fire load". In that design guide, Table 9.3 (heat release values) rates industrial premises at 260 kW/m^2. The fire engineering solution proposed by ... Engineering Services Ltd uses 500 kW/m^2.

The Borough Council's case

17. The Borough Council has consulted the Fire Authority and has rejected your fire strategy proposals because they consider that they do not demonstrate adequate provision for fire safety in relation to what they consider to be a large storage building. The Council has been prepared to consider proposals which do not include a sprinkler system, but believes that the smoke ventilation proposed will not sufficiently limit the development of a fire for a long enough period.

18. The Borough Council has suggested that either a suitable in-rack sprinkler system should be installed in the building or, alternatively, your proposals for a smoke ventilation system could be acceptable subject to modifications to the design calculations such that a flashover would not occur within a reasonable timeframe assuming an ultra-fast fire growth. In support of their case they have made the following points:

(i) the method of storing the metal goods within various forms of packaging is seen as significant in terms of combustibility and fire development and has not been appropriately considered in your case. They contend that a substantial number of the pallets - 7000 - are made of plastic and concerns have been expressed about the use of these. The storage of the goods in racks will allow free heating of adjacent goods and pallets if a fire were to occur and allow a fire to develop quickly. Due to the method of storage the racking system is likely to become unstable within a short time frame and be a risk to firefighters. It is the predicted rate of fire growth and surface spread of flame that are of concern

(ii) BS 5306: Part 2: 1990 is a specification for sprinkler systems and should not be referred to when designing a smoke and heat exhaust system

(iii) the assessment of the building as medium risk by your consultants is not acceptable. *BRE 368, (Design Methodologies for Smoke and Heat Exhaust Ventilation)* has been used as a guide for the calculations for the smoke and heat exhaust system and should therefore also be used as the basis for the rate of fire spread - ie ultra-fast as outlined in Table 10 of that document. The fire strategy should be designed to fit the appropriate growth rate and not vice-versa

(iv) low melting point roof lights have been proven not to work unless all the conditions are right. They create a potential hazard to firefighters. Their effective use would require the provision of smoke curtains etc

(v) the beam detection system provided will not be as effective as it should be. This is because the height and disposition of the storage which is, in parts, above the lower edge of the roof beams will affect the flow of smoke into the detector beam

(vi) the need for adequate water supplies for firefighting is not a motivating factor for the rejection of your proposals

(vii) the cost of the solution is not a valid issue in the Borough Council's consideration of your application.

The Secretary of State's consideration

19. The Secretary of State acknowledges that full compliance with Part B (Fire Safety) of the Building Regulations can be achieved without the need for sprinklers or a smoke ventilation system to be installed. However, by virtue of sub-section 65(2) of the 1981 Act the Borough Council has a duty to consider the storage use of the building in respect of fire prevention and appropriate fire precautions, and in doing so to take account of factors over and above that which it might otherwise be appropriate to consider under the Building Regulations alone.

20. In considering this case the Secretary of State therefore takes the view that there are two issues:

- whether it is reasonable in the circumstances for the Borough Council to exercise its powers under section 65 of the 1981 Act to require the installation of a sprinkler system and/or a smoke ventilation system
- and in doing so whether these requirements are proportionate having regard to the potential for fire growth, and the effectiveness and safety with which any subsequent Fire Service intervention could be carried out.

The Secretary of State has therefore approached this case by first considering the nature of the stored materials and the scale of the proposed compartment.

21. It is acknowledged that much of the material stored in the warehouse will be metal components which will, in themselves, present a negligible contribution to any fire. However, there will still be a fire load consisting not only of some of the stored materials, but also the packaging materials and pallets arranged in high-bay pallet racks. The warehouse itself is approximately 25,000m^3 in size which is more than three times greater than the 7,000m^3 specified by the 1981 Act. The actual number of plastic pallets likely to be present in the warehouse is at issue between the parties, but notwithstanding there is still a potential for a large and, due to the configuration of the fire load (ie the high bay pallet racks), possibly fast growing fire. In view of this the Secretary of State considers that the installation of a sprinkler system and/or a smoke ventilation system would be a justified application of the powers provided by section 65 of the 1981 Act.

22. The underlying principle governing the use of a sprinkler system is that it will help control a fire and prevent further conflagration and/or flashover. The expectation is not necessarily that it will always extinguish the fire but that it will contain the fire until the arrival of the Fire Service. When used in combination with an automatic smoke ventilation system, the use of a sprinkler system enables a fire design scenario to be established which, in turn, facilitates a proper design assessment to be made of the required capacity of the smoke ventilation system.

23. In your case for operational reasons you have chosen not to compartment the warehouse and do not wish to install sprinklers on grounds of cost and the potential for the stock to be destroyed. Your chosen approach has therefore been to design a stand alone smoke ventilation system of sufficient capacity to reduce the build up of smoke and heat in the building and thus delay the onset of flash-over with the resulting rapid escalation of the fire. The design of such a system must first rely on the assumed rate of growth of a fire having regard to the contents of the warehouse, and must derive a time delay compatible with the realistic time within which the Fire Service could attend. The selected value of rate of growth of a fire having regard to the particular contents is therefore crucial to the viability of this approach to fire engineering.

24. The Borough Council has been content to consider the installation and operation of a stand alone smoke ventilation system, but considers your proposal is not adequate to deal with the speed of fire growth which they believe could occur - ie at an ultra-fast growth rate. However, you have argued that according to the British Standards specification for sprinkler systems the contents would be described as low risk; and that to adopt the ultra-fast growth rate would result in the system being unacceptably expensive and unable to perform adequately having regard to a realistic time frame for the Fire Service to attend.

25. Having regard to the critical nature of these calculations for deriving timescales where a stand alone smoke ventilation system is to be installed, the Secretary of State takes the view that for the purposes of fire engineering calculations it is essential that assumed values are selected carefully. Where there is insufficient evidence to derive accurate figures then reasonably robust and pessimistic values must be used. In this case the Borough Council has contested the assumed values you have used, believing them to be too low. The Secretary of State considers that you have failed to provide adequate justification for those design values and as such, in the absence of more relevant evidence, a more pessimistic value should have been selected.

The Secretary of State's decision

26. The Secretary of State has given careful consideration to the facts of this case together with the representations made by the parties.

27. The Secretary of State takes the view that given the nature of the various materials to be stored in the storage area compartment, the configuration of that storage, and the size of the compartment, there is the potential for a large and possibly fast growing fire. He considers that the assumed design values which you have applied appear to lack sufficient justification, and that a more pessimistic value should have been selected if a stand alone smoke ventilation system is to provide an adequate means of controlling such a fire. Accordingly, he dismisses your appeal.