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INTRODUCTION

Analysis of fire statistics reveals that the majority of fires in industrial or commercial premises start in production areas where people and processes are involved. However, when the fire losses associated with large fires are studied it becomes apparent that although fewer large fires start in storage areas, the financial loss from those fires is comparatively very heavy.

In any warehouse old or new - the quantity of combustible material per cubic metre and associated fire load is, by the very nature of things, higher than that in other types of buildings. This makes a fire in a storage area especially difficult to extinguish as it can quickly reach a point at which the heat output increases faster than cooling water can be applied to control it. Once a fire in a storage area has taken a firm hold it often cannot be brought under control until it reaches a physical barrier such as a fire compartment wall. For this reason it is normally considered that fire compartments should not exceed 7000m^3.

A small fire in materials that produce large amounts of smoke can quickly smoke-log an entire building thereby making firefighting operations difficult. The large-scale involvement of breathing apparatus teams to search for the seat of a fire is both hazardous and time consuming with large numbers of wearers committed. Extensive smoke damage may ensue due to time delays experienced when deep penetration is necessary. If the smoke can be controlled and/or released quickly to open air, the fire can be brought under control much faster with the minimum amount of smoke damage.

Fires in storage buildings are likely to be even more costly as buildings become larger, more goods are stored, (mechanical handling uses the available space more efficiently), the goods stored have a greater value and storage buildings become more elaborate with computerisation and automation.

Where the limitation of compartment sizes to 7000m^3 is unacceptable to developers of storage buildings, on the grounds that sub division will interfere with its function, it is possible to accept larger compartments, if certain compensating factors are provided, thereby ensuring that a fire will not achieve unmanageable proportions.

To minimise losses and to reduce the risk to firefighters, i.e. by preventing or delaying rollover/flashover, it is necessary to consider the introduction of measures that will control a situation should fire break out. The provision of compartment walls and floors, fire protection equipment, and effective means for controlling and removing smoke, may mean the difference between a small fire, which can be controlled quickly, or total loss of a valuable building and contents which could be irreplaceable.

Section 19 of the Surrey Act 1985 applies to new, altered or adapted buildings where more than 7,000m³ are used for the purpose of storing or depositing goods or materials.

The Act sets down types of buildings and volume limits regarding stored goods. It allows District Councils to impose conditions after consulting the Fire and Rescue Authority, and provides powers of entry to allow either the Fire and Rescue Service or District Council to monitor the maintenance of the conditions imposed under Section 19(2).

It must be borne in mind that the Surrey Act 1985 was written when the main fire safety enforcement regime was based around the Fire Precautions Act 1971 and it actually refers specifically to the FP Act within section 19. Whilst the FP Act (Amongst others) has be repealed by the Regulatory Reform (Fire Safety) Order 2005 the fundamental fire safety principles are still continued and enshrined within the Order. Therefore, as a result of the provisions within the Interpretations Act 1978 Section 20 (2) the functional requirements of the Surrey act 1985 are not changed.

> *20 - (2)* ***Where an Act refers to an enactment, the reference,*** *unless the contrary intention appears, is* ***a reference to that enactment as amended****, and includes a reference thereto as* ***extended or applied, by or under any other enactment****, including any other provision of that Act.*

OBJECTIVES

When plans are deposited with a District Council, in accordance with Building Regulations, it is the duty of the District Council, following consultation with the Fire and Rescue Authority, **to ensure that adequate provisions are made for preventing the outbreak or spread of fire in or from the building, or reducing the danger from fire in the building.**

The main objectives of Section 19 of the Surrey Act 1985 are:

i) Preventing the outbreak of fire
ii) Preventing the spread of fire from the building
iii) Preventing the spread of fire within a building
iv) Reducing the danger from fire in the building

SECTION 1

LEGISLATION

1.1 Section 19 - Fire Precautions In Large Storage Buildings

19 - (1)In this section –

(a) Reference to the use of a building for a purpose to which this section applies is a reference ***to the use of any building for the purpose of storing or depositing goods or materials where more than 7000 cubic metres of the building are so used****, not being the use for the parking of vehicles or a parking place to which section 18 (Parking Places: safety requirements) of this Act applies;*

Note: "Meaning of building shall mean a building as defined in the Building Act 1984 as any permanent or temporary building, and unless the context otherwise requires, it includes any other structure or erection whatever kind or nature whether permanent or temporary".

(b) *A change of use of a building from use for the storage of goods or materials of the kind specified in any condition imposed in relation to that building under subsection (3) (d) below, to use for the storage of goods or materials of another kind, shall be taken to be a material change of use of the building.*

(2) Where -

(a) Plans are deposited with a District Council in accordance with building regulations in respect of any proposed work or material change of use of a building; and

(b) The plans show that the proposed work will include or consist of the construction, extension or alteration of a building used, or to be used, for a purpose to which this section applies or, as the case may be, the change of use is for use for a purpose to which this section applies;

The District Council shall reject the plans unless they are satisfied, ***after consultation with the fire authority,*** *that they may properly consent to the construction, extension, alteration or change of use of the building, either*

Unconditionally or subject to compliance with any conditions, specified in their consent with respect to the matters mentioned in subsection (3) below for preventing the outbreak or spread of fire in or from the building or reducing danger from fire in the building.

(3) The conditions subject to compliance with which plans may be passed under subsection (2) above are conditions with respect to any of the following matters relating to the building in respect of which those plans are deposited:-

(a) The division of the building or any part of the building into compartments with a cubic extent not exceeding 7,000 cubic metres by compartment walls or compartment floors, or by both such walls and floors (including any openings in such walls and floors), being walls and floors having a fire resistance or not less than two hours for the purposes of building regulations **(See Appendix B)**

(b) *The provision of not less than two hours fire resistance for any external wall of the building which encloses the storage space within the building used for the purpose to which this section applies, or is at a distance from that space less than the height of that space as ascertained in accordance with subsection (11) (a) below, due allowance being made for unprotected areas of the wall permitted for the purposes of building regulations;*

(c) *The vertical extension of any such walls as are referred to in paragraph (a) or (b) above to such height above the roof of the building as may be required to prevent the spread of fire from a building of which the roof has a fire resistance of less than two hours for the purposes of building regulations;*

(d) *The kind of goods or materials to be stored in any such storage space in respect to which consent is given;*

(e) *Except where the first use to which any premises constituting or comprised in the building or, as the case may be, the building as extended or altered, will be up to, after the proposed work or change of use has been carried out, will be a use in respect of which a fire certificate is for the time being required under Fire Precautions Act 1971, the means of ingress to, and egress from, the building or any part of the building, including provision for safe ingress and egress in case of emergency;*

(f) *The* ***provision and maintenance*** *of such of the following as may,* ***after consultation with the fire authority****, appear to the District Council to be necessary:- (***See Appendix A and D)**

(i) *Automatic fire alarms (that is to say, devices which, without manual intervention, originate an alarm of fire) or other fire alarms;*

(ii) *Fire extinguishing systems;*

(iii) Effective means of removing smoke in case of fire;

(iv) *Adequate means of access for fire brigade appliances and personnel.*

(4) *(a)* *To the extent to which any conditions imposed by the District Council in relation to any building in respect of the matters specified in subsection (3) (e) above conflict with the requirements of section 9A of the Fire Precautions Act 1971, those conditions shall not have effect.*

(b) *Subsection (3) (f) (ii) above shall not apply to any building in respect of which a fire certificate issued by the Health and Safety Executive is for the time being required* under the Health and Safety at Work etc. Act 1974.

(5) Section 16 (6) to (8) of the Building Act 1984 shall apply to plans mentioned in subsection (2) above as they apply to plans mentioned in those subsections and sections 36 (2) to (6) of that Act shall apply as if this section were a section of that Act

(6) A person aggrieved by the action of the District Council under subsection (2) above in rejecting plans, or in imposing any conditions, may appeal to the Secretary of State.

*(7) If it appears to the District Council, **after consultation with the Fire Authority**, that any building in the district-*

(a) Has been first brought into use after the commencement of this Act (27th June 1985*) for a purpose which this section applies;*

(b) Has been so brought into use in circumstances in which no notice had to be given, or plans, sections, specifications or written particulars deposited, in accordance with building regulations ; and

(c) Is not so constructed or equipped that, if plans of the work consisting of, or including, the building had been so deposited, the District Council would have passed the plans without specifying conditions with respect to any of the matters specified in subsection (3) above;

*They may, after consultation with the Fire Service for **the purpose of preventing the outbreak or spread of fire in or from the building or reducing danger from fire in the building**, by notice to the owner or occupier of the building require compliance with-*

(i) Such conditions with respect to any of those matters as may be specified in the notice; and

(ii) For the purpose of restricting the use of the building until those conditions have been complied with, such other conditions as may be so specified.

(8) The provision of sections 99 and 102 of the Building Act 1984, (Enforcement of, and appeals against, notices requiring the execution of works) shall apply in relation to any notice under subsection (7) above as if-

(a) References in those provisions to that Act included a reference to that subsection;

(b) In sections 99(2)(b) the words from " and to a further fine" to the end were omitted; and

(c) For the reference in section 102 to the court there were substituted reference to the Secretary of State;

(9) For the purpose of sections 95(1)(a) of the Building Act 1984 as applied by this Act the provisions of this Section shall be provisions ***which it is the duty of the Fire Authority*** *as well as the District Council to enforce.*

(10) If any person, without reasonable excuse, obstructs any means of ingress or egress provided in pursuance of a condition imposed under subsection (3) (e) above, he shall be guilty of an offence and liable on summary conviction to a fine not exceeding Level 4 on the standard scale.

(11) (a) For the purpose of paragraph (a) of subsection (1) above, the aggregate cubic extent of a building, or part of a building, used for any purpose mentioned in that paragraph (hereafter in this subsection referred to as "the relevant purpose") shall be ascertained by measuring the volume of the space therein so used contained within -

(i) The inner finished surface of the external walls of the building and any internal enclosing wall which (including any openings therein) has a minimum fire resistance of two hours for the purpose of building regulations, or, on any side where there is no such wall, a vertical plane at the limit of the space used for the relevant purpose;

(ii) The upper surface of the lowest floor used for the relevant purpose in the building; and

(iii) The under surface of the roof of the building, or any floor over the space used for the relevant purpose which has a minimum fire resistance of two hours for the purpose of building regulations.

(b) For the purpose of this subsection –

(i) No deductions shall be made for any space which is used for ingress or egress or for placing or removing contents of the building or for any space less in width than the height between the floor and roof specified in paragraph (a) (ii) and (iii) above which is between that used for the relevant purpose and an external wall of the building; and **(See Appendix C (i))**

(ii) Where the part of the space used for the relevant purpose, when ascertained in accordance with paragraph (a) above, consists of a number of separate spaces, those spaces and any intervening spaces used for any other purpose shall, except as provided in sub-paragraph (iii) below, be taken as one space wholly used for the relevant purpose; but **(See Appendix C (ii))**

(iii) There shall be excepted from sub-paragraph (ii) above any space which is separated from another space by a distance, or by walls or floors, adequate to prevent a spread of fire to or from that other space **(Appendix C (ii))**

1.2 Maintaining External Access For Fire Brigade In And Around Section 19 Buildings

INTRODUCTION

Section 20 of the Surrey act 1985 enables suitable provision for fire fighting access (including fire appliances) to buildings or to buildings as extended, the section also provides for the maintenance of existing access arrangements to neighbouring premises.

Section 20 however requires the provisions of this section to be endorsed on or accompany the planning permission under The Town & Country Planning Act 1990.

It is therefore necessary for the Fire and Rescue Authority and the Local Authority to monitor all planning applications to ensure that access arrangements are not affected in and around buildings to which Sect 19 of the Act applies.

SECTION 20 ACCESS FOR FIRE BRIGADE
[Extract From The Act]

(1) Except as provided in subsection (2) below, where plans for the erection or extension of a building are deposited with a District Council in accordance with building regulations, the District Council shall reject the plans unless, ***after consultation with the fire authority****, they are satisfied that the plans show;*

(a) That there will be adequate means of access for the fire brigade to the building or, as the case may be, to the building as extended; and

(b) That the building or, as the case may be, the extension of the building will not render inadequate existing means of access for the fire brigade to a neighbouring building.

(2) (a) No requirement concerning means of access to a building or to a neighbouring building shall be made under this section in the case of a building to be erected or extended in pursuance of a planning permission granted upon an application made under the Town and Country Planning Act of 1971, unless notice of the provisions of this section is endorsed on or accompanies the planning permission.

(3) Section 16(6) and (7) of the Building Act 1984 shall apply to plans mentioned in subsection (1) above as they apply to plans mentioned in those subsections and sections 36 (2) to (6) of that Act shall apply as if this section were a section of Part 1 of that Act. See Appendix E).

(4) Any person aggrieved by the action of the District Council in rejecting plans under this section may appeal to magistrates' court.

(5) In this section references to the adequacy or inadequacy of means of access for the fire brigade shall be construed as references to a means of access adequate or, as the case may be, inadequate for use or firefighting purposes by members of one or more fire brigades and their appliances.

1.3 The Buildings Regulations 2000 (B5)

The requirement from Part B of Schedule 1 to the Building Regulations 2000:-

Access **and** facilities for the Fire Service B5.

(1) The building shall be designed and constructed so as to provide reasonable facilities to assist firefighters in the protection of life.
(2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.

The limits imposed by the Building Regulations are those within the site boundary only, Section 20 of the Surrey Act 1985 enables conditions to be imposed with respect to the provision which may be found outside of the site boundary.

1.4 Building Regulations Submission Reports

To ensure that the maintenance of the provisions required under Section 19 sub-section 2 of the Surrey Act is made a condition of Building Regulation approval the following paragraph must be included in Building Regulation Consultation reports relating to work associated with large storage buildings to which the District Council have determined that Section 19 of the Surrey Act 1985 applies.

"By virtue of Section 19 of the Surrey Act 1985 those fire safety provisions provided to satisfy sub-section 2 of that Section must be maintained throughout the time the building is put to a use covered by that Section

To assist in deciding the extent of the fire precautionary measures that should be applied to satisfy Sub Section 2 the flow chart in Appendix A should be used.

With regard to fire safety matters outside the scope of Sub Section 2, reference should be made to Approved Document B / B.S.5588 : Part 11, (Code of Practice for Shops, Offices, Industrial Storage and other similar buildings) etc.

1.5 **Statutory Instruments 2000 No. 2532**

The Building (Approved Inspectors etc) Regulations 2000 Regulation 13(6).

"Where a local enactment would, if plans were deposited in accordance with building regulations, require the local authority to consult the Fire Authority before or during the carrying out of any work, the approved inspector shall consult the Fire Authority in a manner similar to that required by the enactment".

(i) The Approved Inspector is **not able to enforce** the requirements of Sec 19 of the Act with his clients, it is the responsibility of both the Local Authority and the Fire Authority (Surrey Act, Sec 19 (9)).

(ii) A number of circumstances referred to in the Act, are beyond the scope of building regulations and therefore are beyond the **responsibility** of the Approved Inspector, these are:

(a) An extension/increase of the storage capacity above 7000 cubic metres
(b) A change in use of the kind of goods or material, stored in respect of which consent is given based on a change in the materials stored in a building
(c) A change in use to storage from another use.

1.6 **The Regulatory Reform (Fire Safety) Order 2005**

The Order applies to all premises, unless excepted. The Order requires the Responsible Person to carry out a risk assessment of the premises to identify any fire risks to all relevant persons and to take remedial action to eliminate or reduce that risk to an acceptable level.

As the RR(FS)O cover aspects of fire precautions not covered by this guidance document it should not be assumed that compliance with this document would satisfy the Order

SECTION 2

DESIGN CRITERIA

2.1 Introduction

The following information is based on the advice contained in the Smoke Ventilation Association (SVA) Guide Issue 3, and its use would tend to indicate a satisfactory solution. Appendices A & D provide guidance as to the level of fire safety provisions which are appropriate for different categories of building and the types of materials which are stored.

2.2 Fire Engineered Solutions in Section 19 Surrey Act Premises

Whilst the provisions outlined in this document will satisfy the key objectives of Section 19, there is no obligation on developers to adopt any particular approach when presenting a Fire Engineered scheme and officers should be prepared to consider innovative designs.

2.3 Fire Size

Determining a realistic fire size or fire growth is essential to allow smoke calculations to be produced with any reasonable degree of accuracy.

Table 1 (Steady State Fire Sizes) gives examples of accepted fire sizes for buildings **provided with sprinklers**

If further information on specific use is given then the guidance in the L.P.C. Rules should be sought.

TABLE 1 - STEADY STATE FIRE SIZES (SVA)

Hazard Category	Fire Size	Perimeter	Approx Area (m2)	Examples of Occupancy
Group 1	3.0 x 3.0m	12m	9	Breweries
Group 2	4.5 x 4.5m	18m	20	Bakeries
Group 3	6.0 x 6.0m	24m	36	Cotton Mills
Group 4	9.0 x 9.0m	36m	81	Paint Manufacturing
Group 5/1	3.0 x 3.0m	12m	9	Electrical Warehouse
Group 5/2	4.5 x 4.5m	18m	20	Pharmaceutical Warehouse
Group 5/3	6.0 x 6.0m	24m	36	Paper Storage Warehouse
Group 5/4	9.0 x 9.0m	36m	81	Plastics (foam) Warehouse

In unsprinklered buildings the fire size should be taken as being twice the area of its sprinklered counterpart up to a maximum of 100 sq metres (10m x 10m).

It may also be necessary to place some restrictions on storage to ensure that the ventilation system will work effectively. This could include limitations on stack sizes, specifying space separation or controlling the nature of goods stored to ensure sizes will be within acceptable limits, it will therefore be necessary for the Fire and Rescue Authority and the Local Authority to maintain appropriate records of the building management's fire strategy plans in order to ensure continuing control.

2.4 Total Heat Output

The total heat release rate of some known fuels are provided in Table 2 below. These figures have been compiled following experiments both in the U.K. and U.S.A.

The total heat output from a fire will affect the calculated ventilation area or the required exhaust rate, therefore when choosing the appropriate Rate of Heat Release (R.H.R.) it is essential that full consideration is given to methods of storage and packing material.

Table 2 gives both the upper and lower limits for various storage categories and may be used for design purposes.

TABLE 2 - THE VALUES ARE FOR THE RHR PER SQUARE METRE FOR EACH METRE IN HEIGHT.

Storage	Range of RHR ($kw/m^2/m$)
Loose wood and wood products, inc. wood cribs and pallets; upright wood storage.	1800 – 2900
Stacked wood and wood products, inc. furniture; books; crated objects.	30 – 720
Cardboard and paper products, inc. stacked or loose cardboard boxes or cartons which are empty; cardboard tubes or reels; mailbags.	120 – 240
Any storage in cardboard boxes or cartons*.	160 – 1200
Loose or stacked plastic products including polypropylene films in rolls; polyurethane and polystyrene insulation boards: polyurethane trays.	260 - 1280
*NB Excludes the apparently anomalously high values for polystyrene jars in cartons.	

The total heat output is calculated from the product of the plan area of the fire, its height and the appropriate RHR values.

Where information on the exact fuel being burnt is unknown, it is generally accepted that a figure of 500 kw/m^2 should be used for powered vents and 250 kw/m^2 for natural vents, it should be noted that high temperatures may effect the operation of powered vents.

2.5 **High Racked Storage**

The potential for fire growth needs to be fully considered since it is much greater within racked goods than with materials stored only at ground level.

The nature of the goods the type of packing material and the manner of storage will have an effect on the potential fire size.

Guidance on fire size in High Racked Storage provided with sprinklers can be obtained from B.S. 5306 Part 2 Table 1 and L.P.C. Rules.

In buildings containing High Racked Storage with no sprinklers consideration must be given to the potential fire size following collapse of the rack and the potential depth therein of the storage which will effect the total heat release rate (RHR).

In the case of ESFR sprinklers (Early Suppression Fast Response) the sprinkler system is designed to extinguish the fire. The requirements in Technical Bulletin 25 of the LPC Sprinkler Rules states that automatic ventilation should not be provided.

However if ESFR sprinklers systems are proposed, automatic ventilation provided for fire fighting purposes (not means of escape) may be provided with a delay following activation of a sprinkler flow switch. This will allow the ESFR system to reach its Assumed Maximum Number Of Sprinklers to Operate prior to any temperature reduction within the building. The time delay should not exceed four minutes.

In these circumstances the activation and extinguishing capabilities of the ESFR system should not be compromised.

2.6 **Mass Flow Rate**

In order to arrest the descent of the smoke layer the smoke has to be vented at a specific rate for a given smoke layered depth.

The rate of entrainment will be affected by the shape and location of the fire, and any fixed structures such as racking or unusual building features must be taken into consideration when assessing the type of smoke plume that will be produced.

In warehouses the storage will generally be remote from walls therefore calculations relating to mass flow rate should use the appropriate axisymmetric plume calculation. When mezzanine floors are provided the appropriate formula for spill plumes should be used.

2.7 **Sprinklers**

Whilst it is generally agreed that the operation of sprinklers will reduce the fire size and the amount of heat released, current research shows that where sprinklers and smoke ventilators are installed, the operation of ventilators in any one compartment does not delay significantly the activation of sprinklers.

The effect of the sprinklers on the temperature and buoyancy of the smoke must be allowed for in the design of the smoke extraction system. This is particularly relevant where in-rack sprinklers are installed, as the smoke may have to pass through several rows of sprinklers before being exhausted.

Occupancies fitted with sprinklers should use the following smoke layer temperatures when calculating the ventilation requirements:

(i) Natural systems - the operating temperatures of the sprinkler heads:

(ii) Powered systems - the mean value of the maximum (unsprinklered) smoke layer temperature (calculated from the heat output of the fire) and the operating temperature of the sprinkler heads.

The designer should specify the allowances made for sprinklers in the calculations.

2.8 **Smoke Control System Method of Operation**

For a smoke control scheme to work effectively it is important that ventilation operates at the earliest opportunity.

There has been much debate in recent years on the effect of roof ventilation on the effective operation of sprinkler systems.

The argument tended to follow the line that ventilation allows the release of heat, retarding the operation of the sprinklers, resulting in larger fire sizes.

This concluded that ventilators should remain shut, until the sprinklers had operated, to ensure maximum efficiency.

Recent research has indicated that the operation of sprinklers and ventilation systems have little or no effect on each other and that previous arguments are unfounded. As this matter has not been decided with any degree of certainty, where installed, venting should take place simultaneously with the operation of the sprinklers.
Automatic roof ventilators should ‘fail safe’ to the open position on failure of the pneumatic or electrical operating system. Those operated only by fusible link/thermal device do not constitute an automatic smoke extract system.

To facilitate Fire and Rescue Service operations a control panel and associated zone plans should be provided in a suitable agreed location to allow for manual override by Fire Officers.

2.9 Clear layer height

A minimum clear layer height of 3 metres should be provided to aid the entry of Firefighters and firefighting operations. Where storage is higher than 2.5 metres the clear layer should extend to at least 500mm above stacked goods.

Note: It should be noted that the maximum clear layer height that can be physically achieved is 80-90% of the buildings height due to the presence of the ceiling jet in the smoke layer.

2.10 Smoke reservoirs

Smoke reservoir dimensions are subject to the maximum area of the smoke reservoir not exceeding the relevant design size *(As given in SVA Guide Issue 3).*

2.11 Smoke layer temperature

Smoke layer temperatures in excess of 500°C are not acceptable as radiated heat can result in flash over conditions occurring.

Mechanical exhaust relies on fans extracting smoke at a fixed rate and although fans may cope with temperatures up to 300°C, a fire directly below a powered fan could exceed this temperature. To overcome this problem at least one additional ventilator should be provided within each smoke zone to maintain exhaust capacity. Should the temperature of the smoke layer exceed 300°C mechanical systems should not be accepted.

To ensure that there is no loss of buoyancy the temperature of the smoke layer must not be lower than 20°C above ambient i.e. 35°C (or 308°K).

2.12 Replacement Air

Replacement, or inlet air, should be provided automatically on operation of the smoke control system and not rely on manual intervention. Systems which require the Fire and Rescue Service to open doors/openings to provide replacement air should not be accepted. (i.e. the system should be automatically operated 24 hours a day).

The ratio of outlet to inlet area has the following effect on the efficiency of the smoke control system:-

a) 1:1 - 70% efficient (outlet to inlet)
b) 1:2 - 80% efficient
c) 1:3 - 90% efficient
d) 1:4 - 100% efficient

If the area of inlet is too restricted then the incoming airflow may create high wind speeds that are difficult to walk against. To avoid means of escape being hindered replacement air should be so designed that wind speeds do not exceed 5m/s.

2.13 **Wind Effects**

Consideration must be given to the effect of wind pressures on smoke extraction systems, and if necessary a site survey conducted by the designer should be carried out. Care needs to be taken to ensure that natural exhaust ventilators are not installed in a position subject to positive wind pressures. A natural ventilator installed on a roof with a pitch of 30° or less and not close to taller structures, would not usually be adversely affected by windy conditions as wind blowing over the roof would produce a suction pressure at the ventilator, and the exhaust rate through the ventilators would increase.

Installations of natural ventilators on roofs over 30° from the horizontal should not generally be considered. However, with some form of baffling, and supporting data from wind tunnel tests and/or computer simulation such systems may be acceptable

Where changing wind directions may cause positive or negative pressure fluctuation on the building structure, natural extract ventilators should be installed in sufficient numbers and positions and controlled via wind sensor/pressure monitors to ensure that an appropriate number open at any time.

If in doubt about pressure distribution on the building structure, a powered extract system should be used.

Snow loadings should also be considered when designing/siting of both powered and natural supply/extract systems.

The designer should state clearly his assumptions about any effects of wind.

Natural exhaust ventilators and powered exhaust ventilators should never be provided together in the same smoke reservoir.

2.14 **Speculative Buildings**

When designers are called upon to design systems for buildings where details of the occupancy, use, sprinklers etc, are unavailable, the following minimum criteria should be used for design:

4.5m x 4.5m sprinklered fire, clear layer to eaves level, or 500mm above the top of the highest opening.

Replacement air not to be provided via doors and windows.

Smoke compartments should be limited to 2000m² max.

2.15 **External Fire Spread**

The extent to which consideration of external fire spread is necessary is dependent on the use of the building, its distance from the boundary and, in some cases, its height.

The construction of the external walls and the separation between buildings to prevent external fire spread are closely related.

The chance of fire spreading across an open space between buildings, and the consequences if it does, depends on;

(i) The size and intensity of the fire in the building

(ii) The distance between buildings

(iii) The fire protection given by their facing sides, and

(vi) The risk presented to people in other building(s).

Section 19 (3) (a)(b)(c) of the Act enables the Local Authority to apply a standard of fire resistance to floors, compartment walls and external walls, however Approved Document B section B4 provides guidance on external fire spread taking into account those issues listed above.

If the guidance given in Approved Document B (B4) External Fire Spread, is followed then it will be deemed satisfactory for the purpose of this guidance document.

In the event of the developer wishing to reduce compartment sizes to less than 7,000 cubic metres, then all internal dividing walls separating the storage should have the appropriate fire resistance applicable to the elements of structure a minimum fire resistance of two hours including compartment doors.

2.16 **Method of Calling Fire Service**

Where an automatic fire detection or suppression system is provided it should be linked to a manned central monitoring centre to ensure that the Fire and Rescue Service is notified immediately. The CFOA guidance should be consulted regarding the recommended standards for alarm installation and central monitoring station operation.

2.17 **Water Supplies**

The water supply requirements to commercial and industrial complexes is normally provided by the provision of fire hydrants spaced at a distance of approximately 90 metres apart. There should ideally be a hydrant located within 70 metres of the building, if this is not the case the matter should form part of the risk assessment process indicated below.

If any additional hydrants are provided specifically for buildings subject to Section 19 of the Surrey Act they should be positioned in the most strategic position where they will still be usable in the event of an outbreak of fire.

When considering the water requirements consideration should be given to any measures that local water company may have implemented in order to reduce water leakage (e.g. pressure reduction valve). *Further information can be obtained from the Water Officer Surrey Fire and Rescue Service, 70 Wray Park Road, Reigate RH2 0EJ. Tel: 01737 242444*

The SFRS pre-determined attendance (PDA) should be regarded as the general indicator as to initial water requirements for any particular building. In areas where the water requirement is in question, the Water Officer should be consulted in order that a risk assessment approach can be implemented, taking into account attendance times, PDA etc, in terms of the number of initial firefighting jets etc.

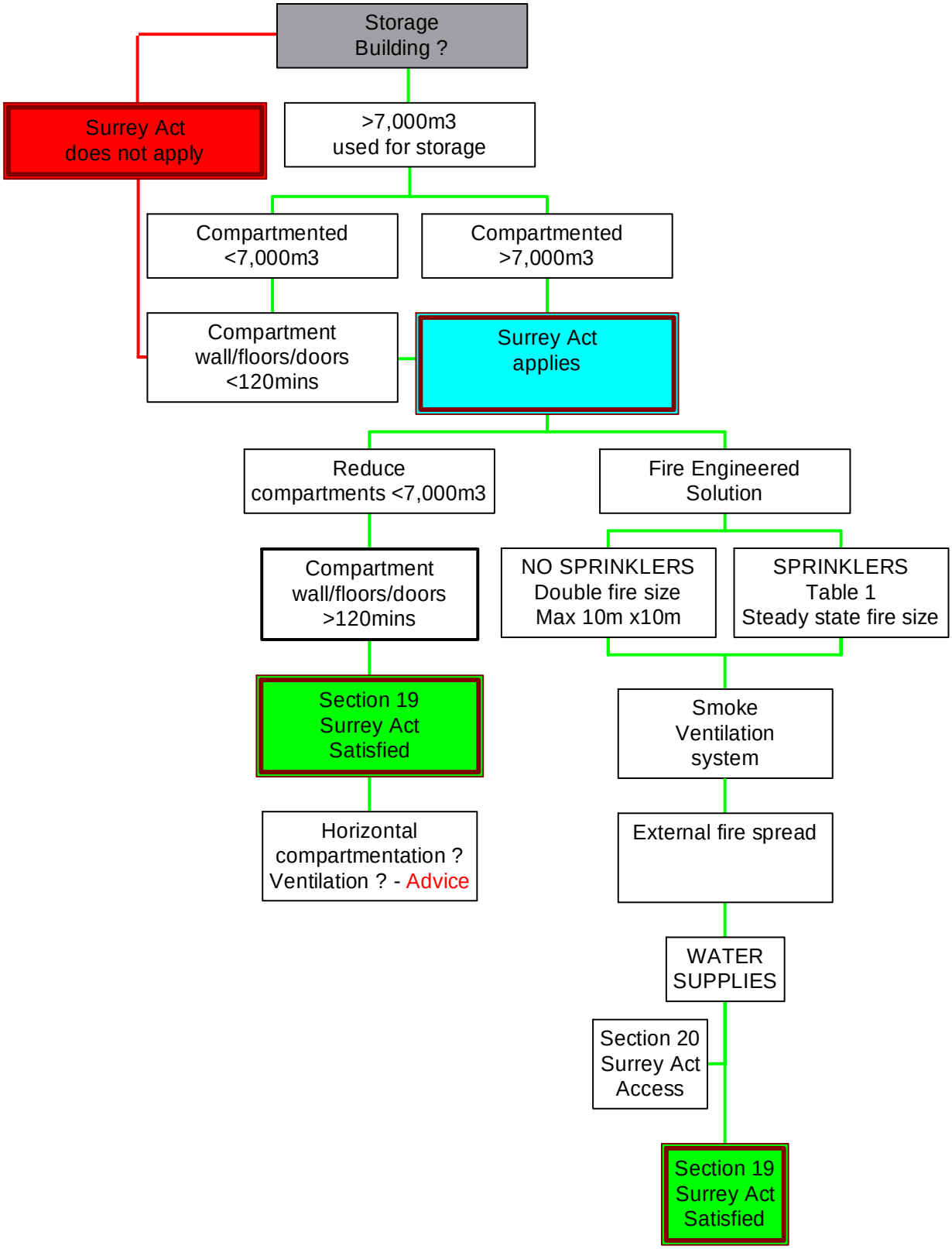
If the provision of water supplies from hydrants is inadequate, a static or natural water supply should ideally be available capable of providing a minimum capacity of 67500 litres (i.e. Sufficient to supply three fire fighting jets at a total of 1500L/min for a period of 45 minutes).

Water supplies for sprinkler installations should be provided in accordance with the Loss Prevention Council Rules.

2.18 **Construction Methods Incorporating Insulated Core Panels**

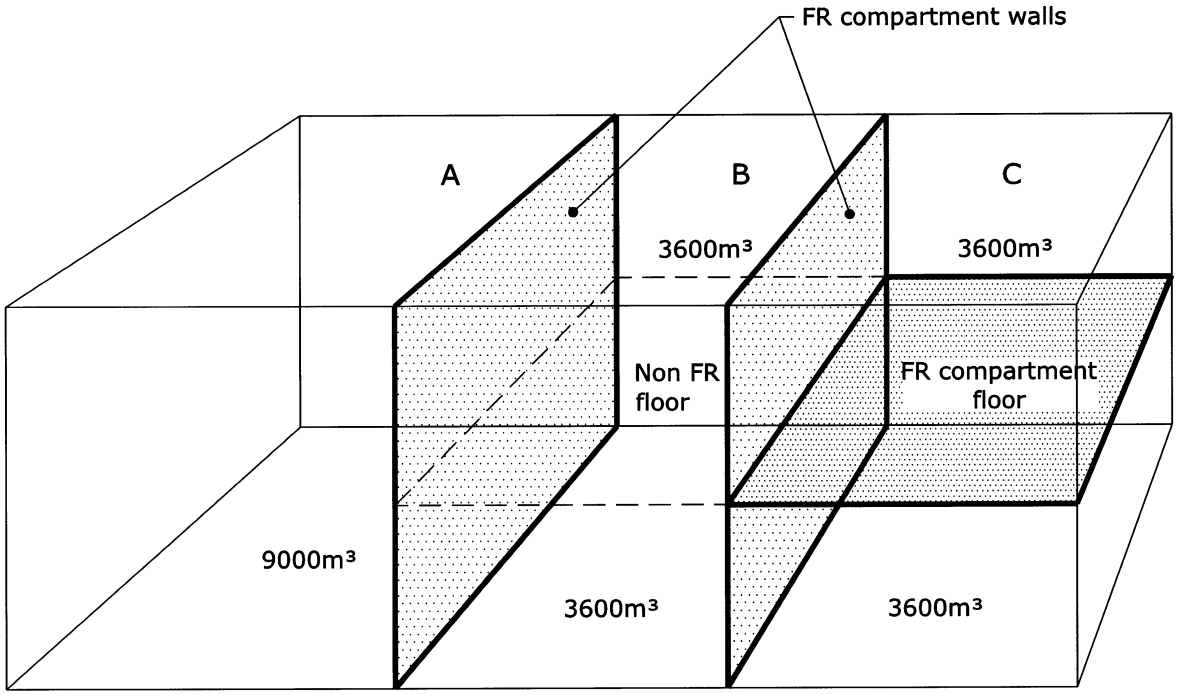
The relevant requirements of the Building Regulations must be complied with in respect of new or materially altered works. The Department of Environment, Transport and the Regions, (The Department for Communities and Local Government now has responsibility for this) had agreed that the guidance given in the International Association of Cold Storage Contractors (European Division) Design, Construction, Specification and Fire Management of Insulated Envelopes for Temperature Controlled Environments, can be considered to provide guidance in respect of Large Insulating Sandwich Panels, for Building Construction which is supplementary to that given in Approved Document B. It should be noted that not all the guidance given within the above document may be applicable or appropriate in every case.

APPENDIX A Surrey Act Flowchart



Appendix B

METHOD OF MEASUREMENT FOR ESTABLISHING
THE AGGREGATE CUBIC SIZE FOR THE
"RELEVANT PURPOSE". SECTION 19(i)a

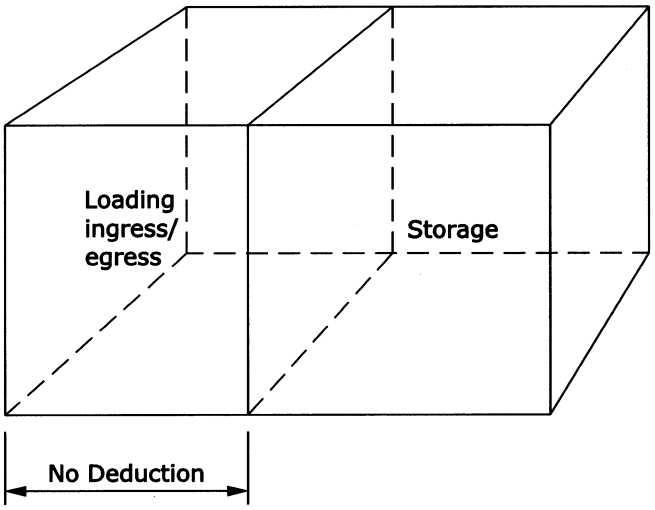


A Surrey Act applies
B Surrey Act applies
C Surrey Act does not apply

NOTE
Example (C) Whilst the FR compartment floor reduces the compartment below 7,000m³ consideration should be given to how the smoke and products of combustion will be ventilated from lower and intermediate floors.

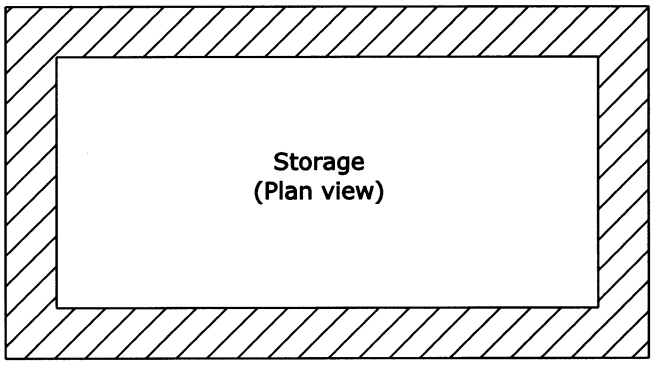
Appendix C(i)

METHODS OF DETERMINING THE RELEVANT STORAGE VOLUME WITHIN BUILDINGS



Section 19 11(b) (i)
"No deduction shall be made for any space which is used for ingress or egress or for placing or removing contents of the building..."

No deduction made for hatched area if this is less in width than its height.

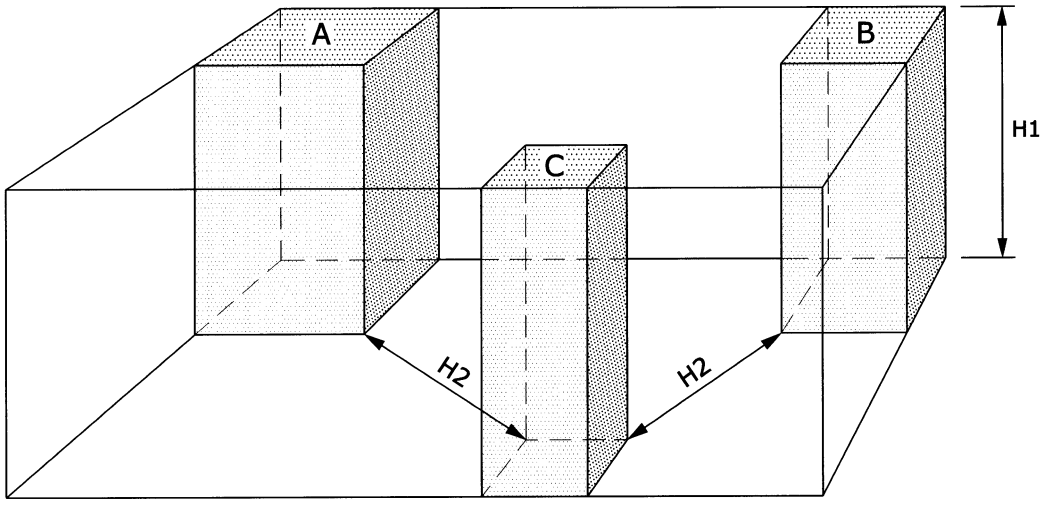


"...or for any space less in width than the height between the floor and roof ...which is between that used for the relevant purpose and an external wall of the building..."

Appendix C(ii)

METHODS OF DETERMINING THE RELEVANT STORAGE VOLUME WITHIN BUILDINGS

Section 19 11(b) (iii)
"There shall be excepted... any space which is separated from another space by a distance, or by walls or floors adequate to prevent a spread of fire to or from that other space."



Suggested method of establishing excepted spaces in Section 19 11(b) (iii)

Those spaces separating the storage that are greater in width than the height of the building when measured in accordance with Section 19 11(a) (ii) and (iii) can be excepted.

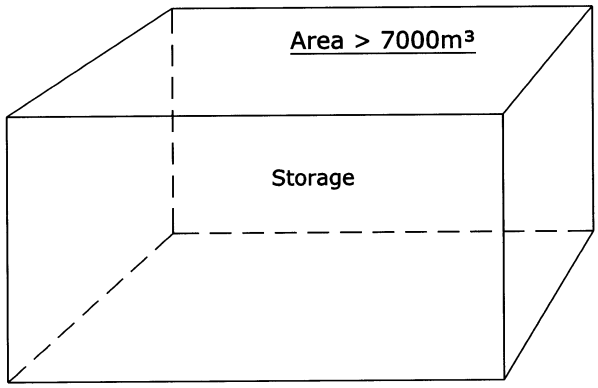
Therefore, where H1 is greater than H2, the whole compartment is counted.
Wheras when H1 is less than H2, each volume A, B, & C is aggregated.

Or:

When the developer can prove by calculation that the radiated heat from one stack will not radiate sufficient heat to adjacent stacks and the collapse of a burning stack will not cause fire spread.

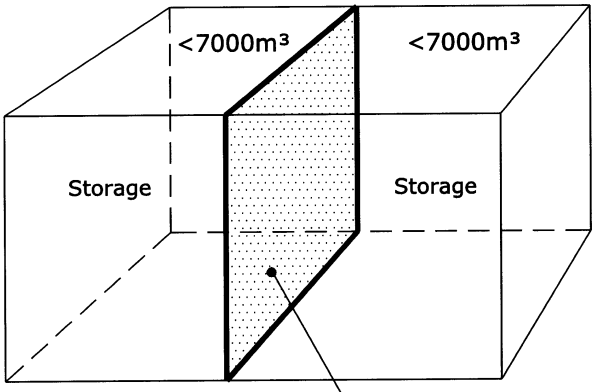
Appendix C(iii)

METHODS OF DETERMINING WHETHER THE SURREY ACT APPLIES TO A BUILDING



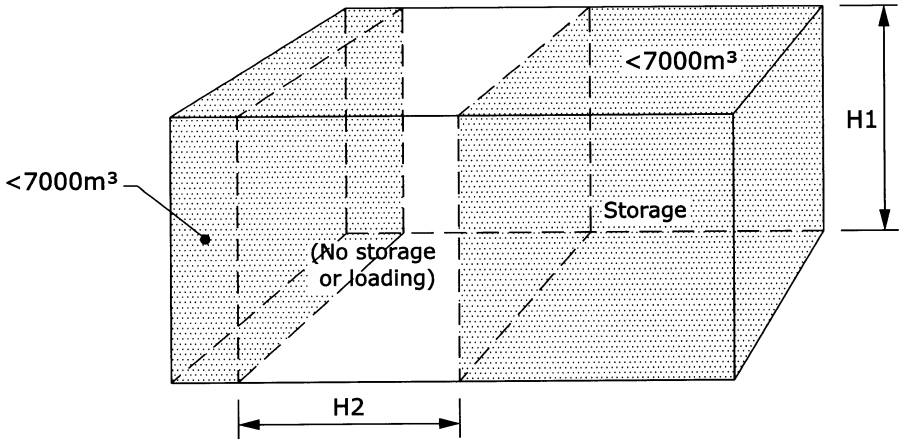
Surrey Act applies

Area > 7000m³ separated by FR compartment walls or floors



Surrey Act does not apply

Area > 7000m³ separated by notional vertical planes



Surrey Act does not apply where H1 is less than H2

APPENDIX D

EXAMPLES OF LOW RISK STORAGE

BUILDING MATERIALS (EXCLUDING TIMBER PRODUCTS)
GLASSWARE, CERAMICS, CROCKERY
MACHINERY, ENGINES, CAR COMPONENTS ETC.
METAL FURNITURE AND FITTINGS
PLUMBING AND SIMILAR FITTINGS
TOOLS & GARDEN/FARM EQUIPMENT
LEATHER GOODS INCLUDING SHOES, CLOTHING ETC
WOOL AND WOOLLEN GARMENTS
COLD STORE PRODUCTS

EXAMPLES OF MEDIUM RISK STORAGE

ELECTRICAL APPLIANCES INCLUDING HOUSEHOLD ITEMS
WINES, BEER AND SPIRITS
LINOLEUM AND CARPET PRODUCTS
WALLPAPER AND WALL COVERINGS
TEXTILES
CLOTHING PRODUCTS EXCLUDING LEATHER
TEA, COFFEE, TOBACCO
FOODS INCLUDING PET FOODS (EXCLUDING COLD STORAGE)

EXAMPLES OF HIGH RISK STORAGE

PAINTING AND STATIONERY MATERIALS
TAR, BITUMEN AND SIMILAR PRODUCTS
TYRES AND OTHER RUBBER PRODUCTS
WAXED OR GREASEPROOF PAPER
MIXED FURNITURE (EXCLUDING METAL FURNITURE)
ALL TIMBER PRODUCTS (INCLUDING BUILDING MATERIALS)
PLASTICS AND FOAMED PLASTIC PRODUCTS
FLAMMABLE LIQUIDS (INCLUDING OILS AND FATS)
PAINTS, LACQUERS, VARNISHES AND SOLVENTS
INDUSTRIAL ALCOHOLS, THINNERS ETC. COMPRESSED GASSES
BAGGED SOLIDS INCLUDING FLOUR, GRAIN ETC.

APPENDIX E – RELEVANT EXTRACTS FROM THE BUILDING ACT 1984

Section 16 (6)
The Authority shall within the relevant period from the deposit of the plans give notice to the person by whom or on whose behalf they were deposited whether they have been passed or rejected.

Section 16 (7)
A notice that plans have been rejected shall specify the defects on account of which, or the regulation or section of this Act for non-conformity with which, or under the authority of which, they have been rejected.

Section 16 (8)
A notice that plans have been passed shall –

(a) Specify any condition subject to which they have been passed, and
(b) State that the passing of the plans operates as an approval of them only for the purpose of the requirements of –
    (i) The building regulations, and
    (ii) Any section of this Act (other than this section) that expressly requires or authorises the local authority in certain cases to reject plans

Section 36 (2)
If, in a case where the local authority are, by any section of this Part of this Act other than section 16, expressly required or authorised to reject plans, any work to which building regulations are applicable is executed –

(a) Without plans having being deposited
(b) Notwithstanding the rejection of the plans, or
(c) Otherwise than in accordance with any requirements subject to which the authority passed the plans,

the authority shall by notice to the owner –

(i) Require him to pull down or remove the work,

or

(ii) Require him either to pull down or remove the work or, if he so elects, to comply with any other requirements specified in the notice, being requirements that they might have made under the section in question as a condition of passing plans.

Section 36 (3)
If a person to whom a notice has been given under subsection (1) or (2) above fails to comply with the notice before the expiration of 28 days, or such longer period as a magistrates' court may on his application allow, the local authority may –

(a) Pull down or remove the work in question, or
(b) Effect such alteration in it as they deem necessary,

and may recover from him the expenses reasonably incurred by them in doing so.

Section 36 (4)
A notice under subsection (1) or (2) above (called a "section 36 notice") shall not be given after the expiration of 12 months from the date of the completion of the work in question.

Section 36 (5)
A section 36 notice shall not be given, in a case where plans were deposited and the work was shown on them, on the ground that the work contravenes any building regulations or, as the case may be, does not comply with the authority's requirements under any section of this Part of this Act other than section 16, if –

(a) The plan were passed by the authority, or
(b) Notice of their rejection was not given within the relevant period from their deposit.

And if the work has been executed in accordance with the plans and of any requirement made by the local authority as a condition of passing the plans.

Section 36 (6)
This section does not affect the right of a local authority, the Attorney General or any other person to apply for an injunction for the removal or alteration of any work on the ground that it contravenes any regulation or any provision of this Act, but if –

(a) The work is one in respect of which plans were deposited,
(b) The plans were passed by the local authority, or notice of their rejection was not given within the relevant period from their deposit, and
(c) The work has been executed in accordance with the plans.

The court on granting an injunction has power to order the local authority to pay to the owner of the work such as compensation as the court thinks just, but before making any such order the court shall in accordance with rules of court cause the local authority, if not a party to the proceedings, to be joined as a party to them.

APPENDIX F MINIMUM ACCESS DESIGN SPECIFICATIONS FOR SFRS VEHICLES

The specifications stated in Building Regulations: Approved Document B: B5 Table 21 are the standard measurements for pumping and high reach appliance access. However, Note 1 under table 21 also states that fire appliances are not standardized and that the Building Control Body may adopt other dimensions in such circumstances. With the introduction of both larger pumping and high reach appliances in Surrey the following **minimum** specifications should be adopted. (Table 21 has been included for reference)

PUMP	**SFRS**	**B5 Table 21**
Minimum road width between kerbs	3.7m	3.7m
Minimum width of gateways	3.1m	3.1m
Minimum turning circle between kerbs	17.2m	16.8m
Minimum turning circle between walls	19.8m	19.2m
Minimum height clearance	3.7m	3.7m
Minimum carrying capacity	17.8 tonnes	12.5 tonnes

AERIAL LADDER PLATFORM	**SFRS**	**B5 Table 21**
Minimum road width between kerbs	3.7m	3.7m
Minimum width of gateways	3.1m	3.1m
Minimum turning circle between kerbs	26.0 m	26.0 m
Minimum turning circle between walls	29.0m	29.0m
Minimum height clearance	3.7m	4.0m
Minimum carrying capacity	25.6 tonnes	17.0 tonnes