



Fires in warehouses and large single storey buildings are more frequent than is generally thought. Recent research¹ has shown that there are 621 fires in warehouses in England and Wales each year. This means that one in five warehouses in England and Wales will have a fire, requiring the attendance of firefighters, over the course of its lifetime. In Scotland 39 warehouses were affected by fire during 2013-2014.

While there may be fewer fires in warehousing than in manufacturing², the impact on business in financial terms can be disproportionately higher through loss of property, stock and the costs of business interruption. All of these fires have economic, social and environmental costs for the locale, the country, as well industry.

A 2014 Cebr¹ study, commissioned by the Business Sprinkler Alliance, looked at the financial and economic impacts of fires in unsprinklered warehouses in England and Wales and found that they:

- Cause a direct financial loss to business of £230m per year, causing a loss to the national economy of £190m per year in productivity and impacts to the supply chain

- Cause approximately 1,000 direct and indirect jobs losses annually through disruption and business failure
- Cause the Treasury to lose £32 million in tax receipts per year – equivalent to the wage cost of 1,320 nurses
- Cause 135,000 tonnes of carbon dioxide to be released into the atmosphere annually - equivalent to the emissions resulting from the annual domestic electricity consumption by a city the size of Portsmouth; and found that the cost of these emissions and of the water used in fire-fighting is £11 million per year
- Cause knock-on effects with an average of 21 local businesses impacted by road closures and air and water contamination per fire

The Cause of Fire

The single, largest cause of fires in warehouses is defective electrical installations or equipment accounting for 28% of fires while another 25% of fires were started deliberately. Other causes include typically:

- Misuse of equipment 11%
- Smoking materials 10%
- Cooking 10%
- Cutting, welding and other hot work 10%

1 The Centre of Economics and Business Research (Cebr) is an independent research and analysis centre www.business-sprinkler-alliance.org/?s+=cebr

2 Fire Statistics Great Britain 2013-2014 DCLG/National Statistics



Vehicle and battery chargers are a frequent cause of fire

Nearly 30% of these fires occur between midnight and 0600 when there are few staff available to provide any sort of effective response.

In Scotland the situation for the main causes of fire is reversed, with 27% being started deliberately and 17% being due to faulty appliances and leads³.

Take Steps to Make Your Warehouses Fire Safe

Experience has shown that the most cost effective approach to protect property from fire is to fit an automatic sprinkler system. This will provide reliable detection, alarm (local and remote) and fire suppression at all hours of the day and night, 365 days a year.

International statistics⁴ show that 97-99% of fires in sprinkler-protected buildings are controlled or extinguished by the systems.

Why this success?

The success is in part due to the simplicity of the sprinkler system: there are no computers or wiring –

so no false alarms. The cost of maintenance is extremely low – running to less than £1000 per year for the average system.

Sprinkler systems have a very long service life, 50 years is common and many systems in use today were originally installed in the 1920s. This is due to strict adherence to standards for components, design and installation. Systems in the UK are most often installed to BS EN 12845: 2015, an exacting standard which has evolved over the years.

Systems may also be installed to NFPA or FM Global standards when requested by the client or insurer. When systems are installed by Third Party Certificated companies, the client will be provided with a Certificate of Conformity under one of the industry's third party certification schemes.

Due to the strict standards in place for sprinkler components, design, installation and the third party certification, the fire insurance industry will normally offer significant premium discounts and or lower policy excesses for premises protected by automatic fire sprinklers. Where there is an insurance interest, the requirements of BS EN 12845 are often augmented by the need to comply with the Technical Bulletins of the LPC Rules for Automatic Sprinkler Systems or the alternative standards mentioned above.

3 Fire and Rescue Statistics in Scotland 2013-2014, Scottish Government.

4 John Hall Jr: *US Experience with Sprinklers*: June 2013, NFPA

How do they work?

It is essential that the supply of water needed by automatic fire sprinkler systems is reliable and guaranteed. This means that water should be supplied directly from a suitably sized service main or other approved sources of water. This could be a river, canal or water storage tank.

However, due to the size, height and fire load in today's warehouses it is likely that in most cases the public water supply will be not be able to provide the necessary pressure and flow rates for the system and therefore it is common for pumps and tanks to be required for reliability.

Sprinkler heads are strategically positioned at roof level, and if appropriate, within storage racking. These heads are connected to the water supply via a network of hydraulically balanced supply pipes, which are distributed throughout the warehouse. Once the sprinkler installation has been activated, the fire is usually brought under control quickly. The system can also operate local alarms to aid evacuation and through an Alarm Receiving Centre alert the fire and rescue service to the fact that there is a fire on the premises.

Water Damage

Concerns are sometimes expressed that the water damage caused by fire sprinklers will be worse than the fire. This is untrue. Only the sprinklers closest to the seat of the fire will operate and in many cases only one or two sprinklers

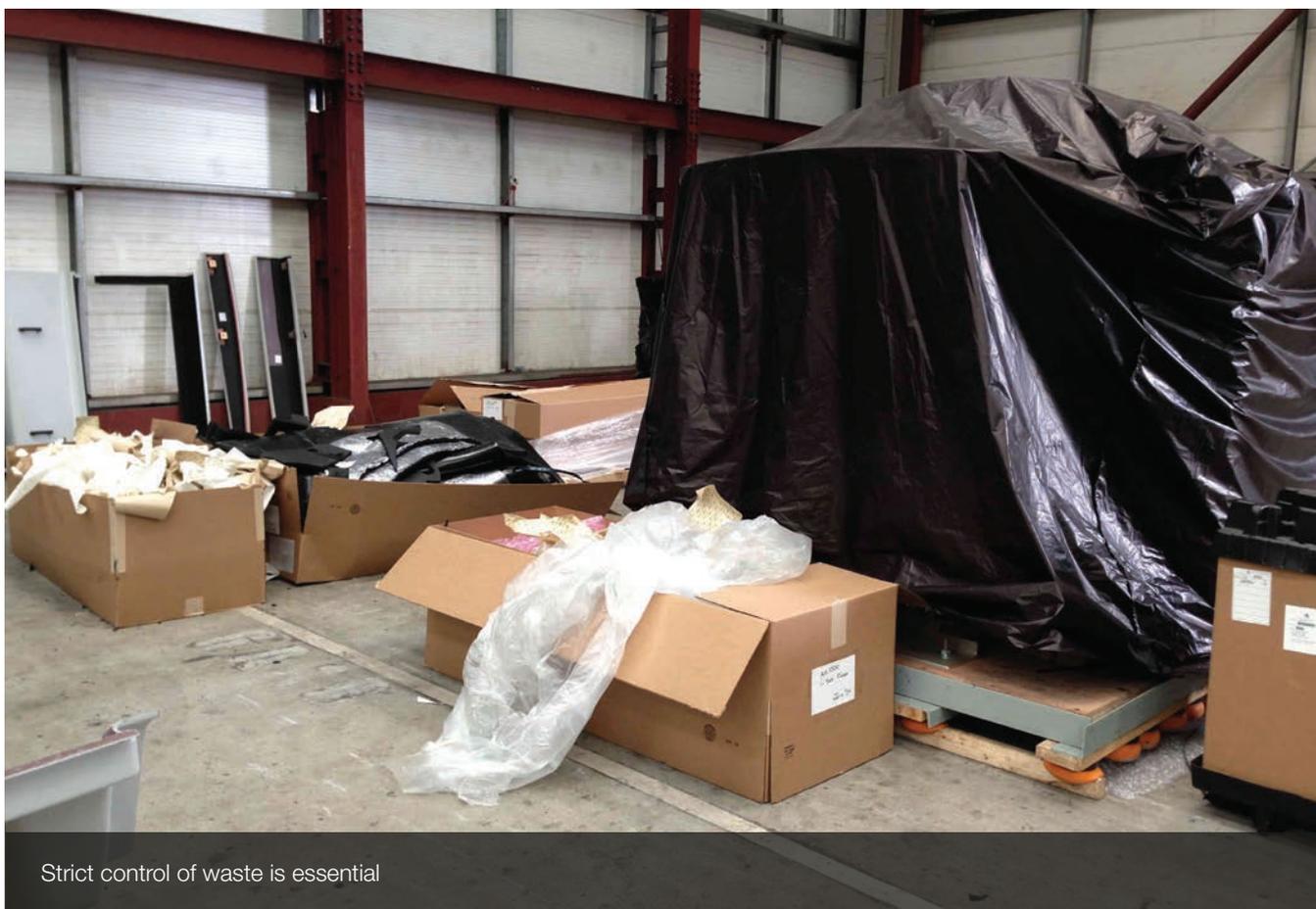
will actually activate. Another common myth is that all sprinkler heads operate simultaneously, this simply does not happen. The water discharged by these few sprinklers is invariably less than the water which would have been used by the fire brigade.

The FPA have said that in most situations sprinklers will only discharge 10-15% of the amount of water needed by the fire brigade to extinguish the fire. More than 100 million sprinklers are installed each year worldwide and every single head is pressure tested prior to leaving the factory. US, Australian and UK research suggests that less than one correctly installed sprinkler in five million will fail by discharging water other than in a fire.

The Legislation

The Westminster government's policy towards fires in workplaces is shaped by two key pieces of legislation:

- The Building Act 1984 – this provides the framework in England & Wales to respond to the challenges posed by fires in commercial premises and dwellings. The framework includes powers to make building regulations that require the implementation of fire safety measures for all new, extended and altered buildings. Approved Document B of the Building Regulations 2000 (as amended) addresses fire safety within buildings and provides practical guidance on ways to comply with the building regulations.



Strict control of waste is essential



Courtesy of Armstrong Pumps Ltd

Modular tanks and pumphouses can be erected swiftly for retrofit installations.

- The Regulatory Reform (Fire Safety) Order 2005) for England and Wales includes fire safety requirements, which involve compliance measures from the business occupying commercial premises. The Order states that the onus is on the employer (in a workplace) or owner to ensure that the necessary fire precautions are taken to provide for the safety of the people using the premises and those in the immediate vicinity.

In Scotland, The Building (Scotland) Act 2003 gives Scottish Ministers the power to make building regulations to:

- secure the health, safety, welfare and convenience of persons in or about buildings and of others who may be affected by buildings or matters connected with buildings
- further the conservation of fuel and power and
- further the achievement of sustainable development.

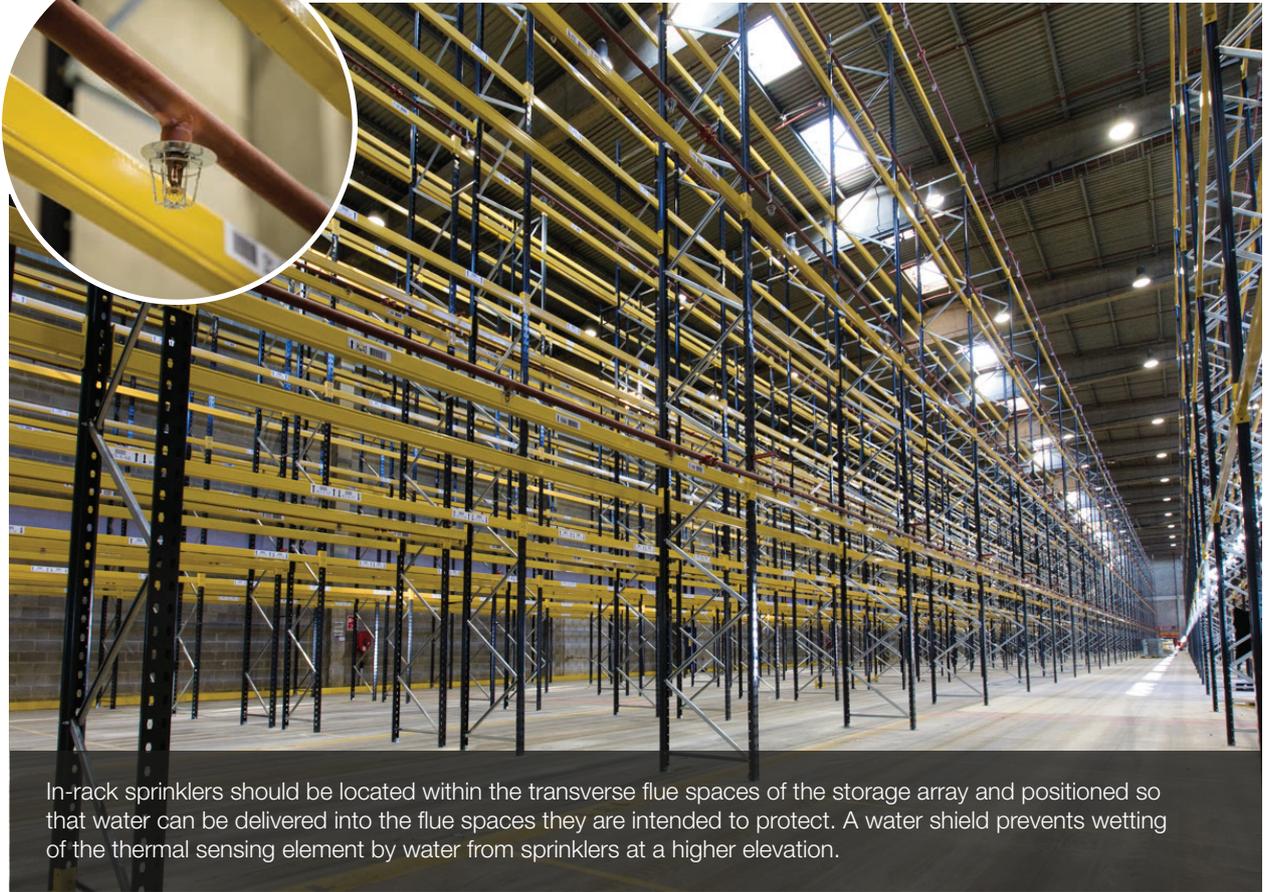
The *Fire (Scotland) Act 2005*, as amended, introduced changes to fire safety law in Scotland and repealed previous fire safety legislation. Sections 53,

54 and 56 of the Act 2005 place a duty on employers, employees, managers, owners and others in relation to fire safety.

Cost Benefits of Sprinkler Protection

The installation of sprinklers must be considered at the start of any building project. Why? Because by doing so, developer and business owners can gain a significant return on investment. Sprinklers allow a developer or business owner to:

- Enhance the project design with more open space, extended fire escape travel distance
- Increase the design density of the overall development
- Reduce building costs due to a reduction in passive fire protection elements and ratings
- Increase revenue and profit due to a greater number of units developed
- Increase the sustainability credentials of the building
- Make the project more marketable as it offers a unique selling point to the customer



Courtesy of AD Sprinkler Protection Ltd

In-rack sprinklers should be located within the transverse flue spaces of the storage array and positioned so that water can be delivered into the flue spaces they are intended to protect. A water shield prevents wetting of the thermal sensing element by water from sprinklers at a higher elevation.

- Reduce the cost of the sprinkler systems themselves if considered early
- Allow the units to be more insurable with premium reductions in most cases

Safety of fire fighters

Recent cases have pointed out the dangers to which fire fighters are exposed – especially in very large single story buildings. Sprinklers control or extinguish fires *before* the fire service arrives. They therefore reduce risks to firefighters and benefit the fire and rescue services.

Environmental issues

There are a number of other reasons for reducing fire incidents and losses attributable to fires in unsprinklered warehouses. With the ever-increasing awareness of the impact on the environment of the products of combustion and of contaminated fire fighting water, a reduction of any kind would be beneficial. Products of combustion can travel extensively in the water used for fire fighting, and the contaminants in smoke may be deposited several miles downwind. Likewise, water used may enter domestic or agricultural water supplies and the effects experienced over a wide area.

In 2011⁵, a study by Bureau Veritas *Assessing the role for fire sprinklers* (commissioned by the Business

Sprinkler Alliance) showed the reduction in water wastage and carbon emissions if sprinklers are installed in single-storey commercial and industrial premises. Key findings from the study include the following:

- Between 25 million and 18 billion litres of water are used to fight all unsprinklered commercial and industrial fires nationally per year
- Only 4.3 million litres of water would be used per year to fight these same fires if the buildings were protected by fire sprinklers
- If fire sprinklers were to be commonly installed, the quantity of water used to fight fires would be approximately 0.02% to 17% of the quantity that is currently needed
- Sprinklered fires are estimated to release between 7.8% and 21.6% fewer carbon emissions compared with an unsprinklered fire in a similar building.

High Fire Risk Storage

One of the issues which most concern the fire and rescue service is the storage of high-risk materials –

5 <http://www.business-sprinkler-alliance.org/wp-content/uploads/downloads/2011/08/BSA-Assessing-the-Role-for-fire-sprinklers.pdf>

especially those involving flammables, toxic chemicals or substances, which can produce serious environmental damage. Modern warehouse/logistics management often demands quick turnaround of consignments and it is possible that the warehouse managers may not be aware of exactly what is being stored.

The presence of sprinklers ensures that the growth of any fire will be contained prior to the arrival of the fire service and allow safer access for crews to extinguish any residual burning.

Case Studies

Sprinkler save at major Kilsby distribution depot: 31st October 2012

Kilsby in Northamptonshire is the site of a major transport hub for UK distributors. At just after 0500 on 31st October 2012 the sprinkler system at the Tesco grocery distribution depot was called into action when a fire occurred in the aerosol compound.

This compound, situated in the 36,000m², 15m high facility, contains highly volatile products such as aerosols and is a lower tier COMAH site.

Two heads activated on the fast response 'in-line' sprinkler system covering the compound and controlled the fire within seconds with minimal damage. The system is fed by a pump from a stored water facility.

None of the 300 occupants of the building were injured in the incident while stock in the distribution centre, believed to value several millions of pounds, was unaffected by the fire.

Northamptonshire Fire and Rescue Service required only a minimal attendance at this incident.

Loading bay sprinkler save in St Helens, 25th April 2014

At 2334 hours on Friday 25th April a serious fire occurred at a very large (50,000m²) distribution warehouse in St Helens.

A 26 Tonne refrigerated HGV was parked under a covered loading bay when ignition occurred within the truck. Merseyside FRS mobilised two appliances with 9 crew members to deal with the incident.

The fire caused 50% damage to the vehicle and 5% damage to the canopy but the situation would have been much worse had it not been for the operation of the sprinkler system, which, in addition to protecting the main building, also covered the loading bay areas.

The system suppressed the fire to such an extent that crews were able to bring the incident under control and the warehouse was fully operational within two hours of the start of the fire. It is reported that 21 heads needed replacement on the Ordinary Hazard, tank-fed sprinkler installation. None of the 50 occupants were reported as being hurt as a result of the fire.

Sprinkler save at Strathclyde warehouse 28th July 2014

Scottish FRS report a successful sprinkler activation which occurred on the 28th July 2014 at a warehouse on the Olympic Business Park, Dundonald in Strathclyde.

At 0642 a call was received from on-site security personnel to a fire in clothing on high racks at the single storey distribution warehouse. 3 pumping appliances and an MIU were mobilised to the incident.

It is reported that one upright sprinkler head on the tank fed wet pipe system activated to extinguish the fire, with total firefighting action being limited to 20 minutes and about 60m² of the premises being affected.

There were no reports of injury or structural damage to the 4,700m² warehouse which is constructed of steel framing with brick supporting walls.

Subsequent information received indicates the potential financial implications for the warehouse operators in that the stock is valued at £10million while only about £48k worth of stock was affected in the incident. It is also understood that the operators have had difficulty insuring the premises due to the high value of stock contained and that there was potential for 250 jobs to be lost.

This publication was jointly prepared by BAFSA and the Business Sprinkler Alliance (BSA).

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