

Travelling Ovens – Fire Detection and Protection

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Travelling ovens in food production premises can be vulnerable to fire damage. Issues such as breakdowns, faults, over temperature and poor housekeeping can result product igniting, with fire potentially spreading through the premises via the conveyor systems, or to other combustible materials in proximity.

This Loss Prevention Standard provides guidance on choosing the most appropriate fire detection and protection systems for travelling ovens.



Travelling Ovens – Fire Detection and Protection



Introduction

Fires in travelling, or continuous ovens, present a number of challenges from a fire detection and control perspective, as described below. It is essential that full consideration is given to these aspects when designing fire detection and protection systems to increase the potential for a fire being controlled, and the damage and business interruption minimised.

This Loss Prevention Standard provides guidance on fire detection and protection in relation to travelling ovens. Refer to Aviva Loss Prevention Standard **Travelling Ovens – Property** for guidance on the main hazards and risk management measures that can help reduce the potential for loss events.



Note: This document is focussed on Property loss prevention in relation to travelling ovens. It is not intended to address Liability exposures. The presumption is that all regulatory requirements, Fire Risk Assessments, and compliance with requirements placed by the local authority having jurisdiction which would include licencing, building permissions, regulations, codes, or standards, have or will be met.

Understanding the Risks

Fires in travelling ovens present a number of concerns from a fire detection and protection perspective, including:

- **Encasement.** Ovens and extraction ducts are typically encased/enclosed. This can hinder firefighting efforts and also increase the potential for gas or dust explosion incidents.
- **Travelling fire.** Fire can spread through premises as conveyors continue moving.
- **Design Efficacy.** Fire protection systems typically require fire to develop within a single location and for heat to accumulate at ceiling levels to activate heads. Inappropriately/incorrectly specified fire protection can result in uncontrolled fire development.
- **Standardisation.** There are no formal test standards for fire protection systems within travelling ovens. This means systems need to be designed specifically for the application, increasing the potential for design errors.

Managing the Risks

Business Impact Assessment

Before designing/installing fire detection and protection systems and considering other risk control measures, an assessment of the anticipated/possible financial losses, for both the material damage and business interruption exposures in the event of a significant or catastrophe loss event should be undertaken. This helps ensure any fire detection and protection systems are sufficient and reflective of the potential loss estimates.

Any proposed changes to risk management controls and fire detection or protection systems should also be managed through a formal Management of Change process. This helps ensure all stages of the change are progressed with the minimal exposure to the existing arrangements.

These proposed changes should also be discussed with your Property Insurer and Insurance Broker.

Refer to the Aviva Loss Prevention Standards **Material Damage Risk Assessment, Business Impact Analysis** and **Managing Change** for further guidance.

Automatic Fire Detection

The compartment housing travelling oven equipment should be covered by an automatic fire detection system, compliant with national standards, regulations, or codes.

- ✓ In the United Kingdom such systems should be compliant with Category L1 or P1 of **BS 5839-1:2017 - Fire detection and fire alarm systems for buildings - Code of practice for design, installation, commissioning, and maintenance of systems in non-domestic premises**. Systems in Ireland should be compliant with Category L1 under **I.S. 3218:2013+A1:2019 Fire detection and alarm systems for buildings - System design, installation, commissioning, servicing, and maintenance and Amendment**. This is vital for life safety and early notification to the Fire and Rescue Service.

Traditional smoke and heat detector types may not be suited to cooking halls. Atmospheric dusts, steam etc., can result in false activations when using smoke detection, whilst heat detection is unlikely to provide a sufficiently fast enough detection to help prevent significant fire damage. The use of aspirating detection technology, which can provide very early warning of the early stages of combustion is recommended. The detection should extend to any ceiling voids as appropriate, and guidance should be obtained from an accredited fire alarm installer. A means of manually raising the fire alarm should also be provided.

To enhance the system design, additional flame detection should be installed to cover the entry and exit points of oven equipment. This will provide very prompt detection of flaming material, which when interlocked to isolate the power or gas supply, associated conveyors and compartment fire shutters, can help prevent fire developing, and/or spreading to adjoining equipment or from the fire compartment.

A response strategy should be formalised. Speed of response is critical in helping to identify and resolve issues before the early stages of combustion develop into a fire, or fire spreads and any fire protection devices deploy.

Any plans to change the existing fire detection system or install a new fire detection system should be discussed with your Property Insurer and Broker.

Automatic Fire Protection

Sprinkler systems are the most reliable means of suppressing fire at its seat and limiting the extent of fire damage and impacts to trading. As such, automatic sprinkler protection are recommended in food production buildings in accordance with national standards, such as the latest **LPC Sprinkler Rules incorporating BS EN 12845** in the United Kingdom.

Consideration should be given to the most appropriate system design for the building.

- A high hazard wet pipe sprinkler system is the most reliable sprinkler system and has the least amount of delay before water can suppress a fire at its seat.
 - ✓ With this system design the sprinkler pipework is normally charged with water, and as soon as the fire activates a sprinkler head in the compartment, water is immediately available to suppress the fire at its seat.
- A pre-action system may be preferred.
 - ✓ With this design the sprinkler pipework is normally charged with a low pressure supervisory air supply.
 - ✓ The sprinkler pipework only charges with water when the automatic fire detection within the food production area goes into a confirmed alarm state. Ideally, this should be when an aspirating detection system operates, and which then opens the pre-action valve. The sprinkler system will then operate normally upon sprinkler head activation.

A suitably accredited sprinkler maintenance company, such as one approved to LPCB Loss Prevention Standard **LPS 1048: Requirements for the approval of sprinkler system contractors in the UK and Ireland**, should be used to design and install the sprinkler system.

Any plans to install or amend an existing fire protection systems should be discussed with your Property Insurer and Broker, who can provide guidance and advice.

Water Mist

Whilst automatic sprinklers systems provide 'whole building' fire protection, they do not extend to cover the internal areas of individual items of plant, such as travelling ovens. Sprinkler systems effectively help to reduce the risk of fire spread to adjacent assets via cooling of the materials and surfaces in proximity however cannot be relied upon to control a fire developing within the oven itself. As a result, the oven could incur significant fire damage, and the business suffer business interruption losses dependant on the criticality of the equipment.

Water mist systems should be considered to provide fire protection within travelling oven systems and/or compartments housing such equipment, whether to support 'whole building' sprinkler systems, or as part of a fire strategy to provide targeted fire protection to higher risk processes/equipment.

Note: Water mist systems would not normally be installed to provide compartment protection in addition to any existing sprinkler systems within the compartment, and would typically be installed to provide localised protection to the travelling oven equipment only. Changes to the sprinkler system heads may however be necessary to complement the localised water mist fire protection.

These systems emit finely divided water droplets under high pressure through small orifice nozzles to produce a mist. This mist thermodynamically cools the fire via evaporation of the water particles and reduces the oxygen within the compartment by steam displacement. The system requires less space than other fixed protection systems, typically comprising a small water tank and pumps but is bespoke to every installation and will be designed to meet the requirements of the cooking compartment e.g., size and volume, fire load, fire behaviour, room sealing etc.

The systems are designed to suppress rather than fully extinguish a fire and additional firefighting action will need to be factored in to planning and contingency arrangements.

There is currently no recognised test standard for water mist systems installed in travelling ovens, and as such water mist protection system would need to be a bespoke design for the specific application. Important points for consideration include:

- A cause and effect analysis should be undertaken by the system designer, with input from site representatives, detailing what are the resultant effects of the water mist components i.e. detection and nozzles operating at various points across the protected area e.g. oven, extraction, openings, connecting conveyors, compartment size etc.
 - ✓ The cause and effect analysis ensures consideration is given to all anticipated fire scenarios, supporting better design and efficacy of the protection system and associated mitigations.
- Ensuring the design provides water mist protection through the travelling oven, entry and exits points of the oven and extraction systems. By omitting protection of the exit/entry points and extraction, the risks of fire travelling to adjoining plant e.g. spiral freezers etc., or igniting materials in proximity are significantly increased.

Note: Asbestos containing materials may be present within some oven and extraction equipment. This should be thoroughly investigated before commencing installation works.

- The water supply should be adequate for the oven design and reflect the speed of the conveyor systems. For instance, should product be within the travelling oven(s) for twenty minutes, it is essential the water supply covers this period along with the time taken to travel through the protected area of the connected conveyors on the entry and exit points e.g. two metres.
 - ✓ Tank and pump based low pressure systems are generally recommended for travelling oven protection. Such systems produce larger mist particles which are more effective at wetting and cooling both burning goods and any adjacent materials and surfaces.
 - Cylinder fed systems have a short operational time, due to a limited water supply, and once the cylinders are exhausted, the protection ceases.
 - Tank and pump systems have the added advantage of being refilled from the water mains during operation, allowing for a longer continual water supply.

- A substantial volume of water storage will be required, and a suitable internal location should be factored into the design specification.
- Detection should be confirmed prior to activation of the watermist system, i.e. two different detectors operating.
 - ✓ This helps reduce the risks of false activation and lost productivity, impairments etc.
- Automatic interlocks to be installed to ensure the gas or electrical power supplies to the travelling oven(s) and any associated conveyors (once product has cleared the oven) or systems such as grease or glaze sprays etc., isolate safely upon operation of water mist fire protection systems.
- The entry and exit point protection should cover a distance of at least two metres from the oven openings to ensure any fire is effectively suppressed.
- Ensure manual operating controls are also installed on, or near escape routes.

Refer Aviva Loss Prevention Standard **Water Mist Fire Protection Systems** for further guidance.

Critical Control Panels

Oven switch/control cabinets are vulnerable to fire, being sealed units that are not designed to allow water from sprinklers or watermist systems to penetrate. This can result in significant downtime of key plant and equipment whilst repairs are carried out, and potentially catastrophic losses should the fire spread through the premises.

The installation of direct low pressure fire suppression system to individual switch/control cabinets can help reduce the potential for such fire damage. Such systems typically release an extinguishing agent upon activation, suppressing small fires within the cabinet.

- Any direct low pressure suppression system should be approved and certificated to a recognised standard, such as Loss Prevention Standard **LPS 1666 Requirements and Test Procedures for the LPCB approval of Direct Low Pressure Fire Suppression Systems** In the United Kingdom.
- The system should be installed by a company that has achieved independent third-party accreditation for competence in this field. The most common design, installation and service accreditation schemes in the United Kingdom for Direct Low Pressure Fire Suppression Systems being:
 - ✓ **LPS 1204 - Requirements for Firms Engaged in the Design, Installation, Commissioning and Servicing of Gas Extinguishing Systems (firms accredited to this standard can also register/apply for BAFE scheme SP202 accreditation).**
 - ✓ **BAFE SP203-3 - Design, Installation, Commissioning and Maintenance of Fixed Gaseous Fire Extinguishing Systems Scheme.**
- The systems should be interlocked to shut down all electrical power to the oven upon activation, and relay through to the fire alarm system to ensure prompt warning is provided to responsible persons e.g., site engineers, security personnel, fire marshals etc.

Alarms

Alarms associated from the above should raise a site fire alarm or monitoring alarm to ensure there is an immediate emergency response and escalation if needed. Appropriate training should be provided on safe isolation of equipment. If not already in place you may wish to consider connecting the alarm to a constantly attended location or an approved Alarm Receiving Centre. An accredited fire alarm installer can provide further guidance.

Interlocks

Where installed, interlocks should be tested at least annually and restored following any impairment to the fire protection and alarm systems.

Manual Fire Extinguishing

- Ensure appropriate numbers and type of fire extinguishers are present within the premises, and workers are adequately trained.
- Some jurisdictions require or recommend the presence of fire hose reels. Ensure this is reviewed and implemented as stipulated in local or national regulations, codes or standards.

The Aviva Loss Prevention Standard **Fire Extinguishers** provides guidance on the number, type, location of appliances along with guidance on selecting a competent installer.

Maintenance and Testing

- Fire detection systems should be serviced and maintained in accordance with installer recommendations and local regulations, standards or codes.
 - ✓ In the United Kingdom **BS 5839-1:2017 - Fire detection and fire alarm systems for buildings - Code of practice for design, installation, commissioning, and maintenance of systems in non-domestic premises** provide further guidance on maintenance of fire detection and alarm systems.
- Fire alarm systems should be checked daily and tested at least weekly to ensure there are no faults and the system is working correctly. Your fire alarm installer can provide guidance in this regard.
- Fire sprinkler systems and pumps should be serviced and maintained in accordance with installer recommendations, based on guidance within accepted international standards such as **BS EN 12845: Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance** or **NFPA 13 Standard for the Installation of Sprinkler Systems**.
 - ✓ A suitably accredited sprinkler maintenance company, such as one approved to LPCB Loss Prevention Standard **LPS 1048: Requirements for the approval of sprinkler system contractors in the UK and Ireland**, should be used to maintain the sprinkler system.
- The sprinkler system should be subject to an inspection and test programme which includes:
 - ✓ Weekly water motor alarm test.
 - ✓ Weekly automatic pump starting test.
 - ✓ Weekly checks on:
 - Trace heating and other local heating systems.
 - Water and air pressure readings.
 - Valves left in correct operating condition.
 - Alarm signal connections.
 - ✓ Monthly battery charging and battery health checks.
 - ✓ Monthly suction tank checks.

Note: Your Property Insurer will typically provide test cards and guidance to support testing regimes.

- Other protection systems should be checked weekly, and the room protected also checked to ensure no material changes to the protected hazard and the room integrity, where relevant, has not been compromised e.g. damage to doors, seals, etc., and be subject to a maintenance programme as per manufacturers or installers guidelines.

Impairments

Ensure any impairments relating to fire detection and protection systems are reported to your Property Insurer and Broker. Temporary changes may be necessary to some arrangements whilst impairments are ongoing.

Training

Ensure appropriate training on fire detection and fire protection systems is provided to relevant stakeholders to reflect their level of responsibility. This should include manual activation, investigation of alarm activations and elevation procedures.

- Your fire systems maintenance company will be able to provide training on the routine checks and the weekly/monthly testing requirements.
- Ensure this training is documented and reviewed routinely.
 - ✓ New starters should receive training before commencement of fire checks/testing duties.
- ‘Dry run’ exercises are recommended to test emergency response procedures.

Other Property Risk Management Guidance

Fire detection and fire protection systems may need to work in collaboration with other risk management processes and controls to produce optimal fire containment and suppression results.

Aviva Loss Prevention Standard – **Travelling Ovens – Property** provides further guidance on property risk management.

Key Action Steps

- Ensure a business impact assessment has been undertaken before introducing risk management controls and commissioning fire detection and protection designs.
- Fire protection and detection systems should be bespoke to reflect the sensitivity of the equipment and processes. Ensure your Property Insurer and Broker are engaged as soon as possible.
- Utilise the services of experienced, reputable, and accredited companies to design detection and protection systems.
- Once installed, complete weekly checks to ensure fire detection and protection systems are operating normally with no faults.
- Also undertake weekly and monthly testing as stipulated in design standards, codes or by your Property Insurer.
- Ensure all systems are serviced and maintained as per installer and Property Insurer recommendations/requirements, and in accordance with accepted standards or codes.
- Ensure system adequacy is assessed whenever a fundamental change is made to the layout of the premises or equipment is installed or removed.
- Provide appropriate training for relevant persons.

Checklist

A generic **Travelling Ovens - Checklist** is available which can be tailored to your own organisation.

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Sources and Useful Links

- [BS 5839-1:2017 - Fire detection and fire alarm systems for buildings - Code of practice for design, installation, commissioning, and maintenance of systems in non-domestic premises.](#)
- [BS 8489-1:2016 Fixed fire protection systems – Industrial and commercial watermist systems Part 1: Code of practice for design and installation.](#)
- [BS EN 14972-1:2020 Fixed firefighting systems – Water mist systems Part 1: Design, installation, inspection, and maintenance.](#)
- [LPS 1230 – 1.2 Requirements for fire testing of fixed gaseous fire extinguishing systems.](#)
- [NFPA Codes and Standards](#)
- [BS EN 12845:2015+A1:2019 Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance](#)
- [LPS 1204: Requirements for firms engaged in the design installation, commissioning and servicing of gas extinguishing and condensed aerosol systems](#)
- [BAFE SP203-3 Design, Installation, Commissioning and Maintenance of Fixed Gaseous Fire Extinguishing Systems Scheme](#)
- [LPS 1666: Requirements and Test Procedures for the LPCB Approval of Direct Low Pressure Application Fixed Fire Suppression Systems](#)
- [FM 5560 Water Mist Systems](#)
- [FM 4-2 Approved Water Mist Systems](#)

Additional Information

Relevant Loss Prevention Standards include:

- **Travelling Ovens – Property**
- **Travelling Ovens – Checklist**
- **Fire Compartmentation**
- **Fire Doors, Fire Shutters and Fire Dampers**
- **Heat and Smoke Venting Systems**
- **Sprinkler Systems – How they Operate**
- **Sprinkler Systems – Review of Hazard**
- **Sprinkler Systems – Winter Precautions**
- **Hot Work Operations**
- **Thermographic Surveys**
- **Maintenance Regimes**
- **Water Mist Fire Protection Systems**
- **Conveyors**

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