



ACE Global Engineering Network  
Food & Beverage Industry



# ACE Global Engineering Network

## Food & Beverage Industry

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## Occupancy Overview

This segment is extremely diverse and wide ranging in its products and processes. This ACE Industry Fact Sheet does not set out to cover the subject in great detail but rather to provide a broad overview.

The food and beverage industry is extremely challenging from a risk-management perspective. From the point of view of the insured, food hygiene is the main standard, with all other considerations secondary. In general terms, food and beverage risks have much higher standards than most other areas of industry, apart from the semi conductor and health/pharmaceuticals segments.

To meet stringent hygiene requirements, premises are usually very clean and tidy, with frequent self inspections and waste removal. High standards apply to electrics, contractor control, maintenance and security.

However, many premises frequently fail to meet standards in the installation of AFA, sprinklers, fire separation, fire resistive construction etc. In addition, housekeeping beyond the hygiene-controlled areas can be a problem.

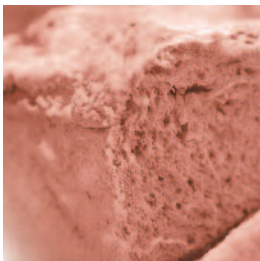
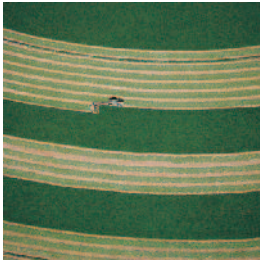
Generally, warehousing/storage is a separate risk, as products, such as foodstuffs, can have a relatively short shelf life and are dispatched as soon as possible after manufacture. There are, of course, exceptions such as tinned goods, preserves and beverages such as soft drinks, spirits, tea, coffee and beer/ale.

The ACE Global Engineering Network should be consulted for detail of particular occupancies and related hazards/loss prevention measures.



Occupancy	Description	ICC	Class	NAIC	ATC OCC Code	SIC
Food & Similar Products	Bakery Products(Bread, cakes, pastries, pies, biscuits, cookies)	2051	5	311813	14	2051
Beverages (Malt beverages – beer, ale etc.)	With or without Maltery	2082	8	312120	14	2082
Beverages (Malt beverages	Malt Houses	2083	5	312120	14	2083
Beverages (Malt beverages – beer, ale etc.)	Winery (Still & carbonated)	2084	8	312120	14	2084
Beverages (Malt beverages – beer, ale etc.)	Distilled & Blended Liquors (Molasses & Alcohol distilleries)	2085	5	312120	14	2085
Beverages (Malt beverages – beer, ale etc.)	Brandy Manufacturing – Blending/Process/Ageing	2085	5	312120	14	2085
Beverages (Malt beverages – beer, ale etc.)	Bottled & Canned Soft Drinks (Carbonated & Mineral Waters)	2086	8	312111	14	2086
Beverages (Malt beverages – beer, ale etc.)	Bottled & Canned Soft Drinks (Carbonated & Mineral Waters) if process includes plastic bottle production	2086	5	312111	14	2086
Canned & Preserved Fruits & Vegetables	Vegetables, Preserves & Speciality Foods	2032	5	311423		2033
Canned & Preserved Fruits & Vegetables	Dried & Dehydrated Fruits, Vegetables & Soup Mixes	2034	5	311423	14	2030
Canned & Preserved Fruits & Vegetables	Frozen Fruits, Juices, Vegetables & Specialties	2037	5	311412	14	4222
Canned & Preserved Fruits & Vegetables	Fruit & Vegetable Packing Sheds making)	2039	4	115114	14	2099
Canned & Preserved Fruits & Vegetables	Dairy Products Butter, cheese, milk, & ice cream (If milk powder production is not separated by approved fire resistive or blast proof walls. Downgrade to 2020 – 4	2020	5	311514	14	2020
Canned & Preserved Fruits & Vegetables Fats & Oils	Milk powder production	2020	4	311514	14	2023

Occupancy	Description	ICC	Class	NAIC	ATC OCC Code	SIC
(Animal & vegetable oils, by products – animal & marine fats & oils)	Pressing Process	2077	4	311225	14	2046
Fats & Oils (Animal & vegetable oils, by products – animal & marine fats & oils)	Extraction Process	2077	2	311225	14	2074
Animal & Marine Fats, Oils & Vegetable Oil Mill Production	Expeller and Hydraulic Pressing, Steam Distillation, Turbo Distillation, Winterising, Scarification, Supercritical Carbon Dioxide Extraction (without ethanol extraction), Aqueous enzyme defatting, Hydrodiffusion and Enflourage	2074	4	311225	14	20742
Animal & Marine Fats, Oils & Vegetable Oil Mill Production	Extraction involving flammable solvents such as Hexane, Ethanol (in association with supercritical carbon dioxide) or Heptane, and processing involving Hydrogenation using hydrogen gas. NB Include direct steam distillation using open fire	2074	2	311225	14	2076
Vegetable oil mill by-products	Vegetable oil cake and meal, & animal fodder	2076	3	311225	14	2077
Vegetable oil mill by-products	Margarine & Shortening	2079	5	311225	14	2079
Vegetable oil mill by-products	Margarine & Shortening with Hydrogenation involving use of hydrogen gas	2079	2	311225	14	2077
Grain Mill Products (Flour, cereals, prepared feeds, & pet foods - blended & prepared flour mixes & doughs)	Cereals, Breakfast Foods (Corn meal, porridge)	2043	5	311230	14	2043
Grain Mill Products (Flour, cereals, prepared feeds, & pet foods - blended & prepared flour mixes & doughs)	Dog, Cat & Other Pet Foods (Canned & Frozen)	2047	5	311119	14	2047
Grain Mill Products (Flour, cereals, prepared feeds, & pet foods - blended & prepared flour mixes & doughs)	Dog, Cat & Other Pet Foods (Dry)	2047	5	311119	14	2047
Grain Mill Products (Flour, cereals, prepared feeds, & pet foods - blended & prepared flour mixes & doughs)	Flour & Other Grain Mill Products (Wheat, corn, rice etc.)	*2041	2	311119	14	2041
Prepared Feeds & Ingredients for Animals & Fowl, Miscellaneous	Modern	2048	5	311119	14	2048
Prepared Feeds & Ingredients for Animals & Fowl, Miscellaneous	Other	2048	3	311119	14	2048
Prepared Feeds & Ingredients for Animals & Fowl, Miscellaneous	Wet Milling (Wet process, producing corn syrup, dextrose, glucose, corn oil, meal, various starches or flours, including potato flour, corn starch, rice starch, and tapioca) Steam Heated	2046	3	311119	14	2047
Meat Products (Slaughtering, Rendering, Curing, Packing & Canning).	Slaughtering & Abattoirs	2011	5	311611	14	0751



Occupancy	Description	ICC	Class	NAIC	ATC OCC Code	SIC
Meat Products (Slaughtering, Rendering, Curing, Packing & Canning)	Meat Products (Slaughtering, Rendering, Curing, Packing & Canning) – Meat Packing Plants (Canning, curing, etc. – also including sausages and other prepared meat products, from purchased carcasses and other materials – no killing on premises)					
Meat Products (Slaughtering, Rendering, Curing, Packing & Canning)	If smokehouses (not artificial smoking) on premises	2011	5	3116112	14	0751
Meat Products (Slaughtering, Rendering, Curing, Packing & Canning)	Poultry Dressing & Packing poultry and rabbits; egg processing and dressing.	2016	5	311615	14	2015
Sugar & Confectionery Products	Modern	2063	5	311311	14	2063
Sugar & Confectionery Products	Other	2063	4	311311	14	2063
Candy, Sweets & Other Other Confectionery Products	Large, Modern	2065	5	311340	14	2064
Candy, Sweets & Other Confectionery Products	Other	2065	4	311340	14	2064
Cane Sugar Refining and Processing	Modern	2061	5	311312	14	2062
Cane Sugar Refining and Processing	Other	2061	3	311312	14	2062
Chocolate & Cocoa Products	Semi Finished Chocolate products, Cocoa Powder, Paste & Butter, including roasting of beans	2066	5	311320	14	2066
Chocolate & Cocoa Products	Other, where the strating material is blocks of chocolate	2066	5	311320	14	2087
Miscellaneous Food Preparations & Kindred Products	Fresh Pasta (Macaroni, spaghetti, noddles, vermicelli)	2098	5	311991	14	2087
Miscellaneous Food Preparations & Kindred Products	Dried Pasta (Macaroni, spaghetti, noddles, vermicelli)	2098	6	311823	14	2087
Miscellaneous Food Preparations & Kindred Products	Coffee Roasting & Grinding and Chicory Manufacture. (Also instant, not from cereal)	2095	5	311920	14	2087
Miscellaneous Food Preparations & Kindred Products Coffee Trilladoras (Husking & Grading)	Coffee Trilladoras (Husking & Grading)	2095	5	311920	14	2087
Fish & Seafood	Cooked & Canned (No Smokehouse)	2091	5	311712	14	2091
Fish & Seafood	Cured (artificial smoking, salting or drying, fresh or frozen)	2092	5	311712	14	2092
Fish & Seafood	Cured – with Smokehouse	2092	5	311712	14	2092
Fish & Seafood	Manufactured Ice	2097	8	312113	14	2097



Occupancy	Description	ICC	Class	NAIC	ATC OCC Code	SIC
Food Preparation & Kindred Products N.O.C	Low Hazard (Honey – strained & bottled yeast factories)	2099	5	311999	14	2043
Food Preparation & Kindred Products N.O.C.	Moderate Hazard (Tea factories, prepared spices, packaged frozen foods, e.g., pizza, TV dinners)	2099	4	311920	14	2043
Food Preparation & Kindred Products N.O.C.	High Hazard (Corn chips, potato, crisps High Hazard popcorn, peanut butter)	*2099	3	311919	14	2052

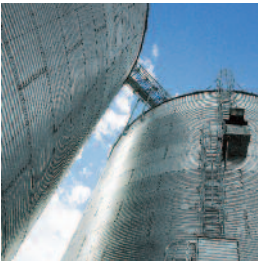
NB. Potato chips represent a higher hazard than corn chips

\* Refer to ACE Global Engineering Network

## Special Hazards

The hazards relating to this industry fall broadly into three sections:

- Warehousing and storage
- Construction
- and process.



### Warehousing and storage

On-site warehousing often consists of a single open space where goods are either stacked on racks or block stacked on pallets. Without sub division and aisle separation, fire can gain access to densely packed goods. Research by the British Research Establishment (BRE) shows that fire can reach the top of ten metre high racking in two minutes.

Warehousing can represent an exposure hazard to the process risk by way of fire loading, particularly if there is no fire wall separating the two occupancies. It is estimated that there are 2500 warehouse fires within the UK annually. The baking industry has experienced a number of devastating losses from fires within the last 12 months.

### Construction

Food industry premises usually comprise one main outer building. Within this area there are small inner compartments and peripheral rooms which support the main production.

To enable the transfer of products throughout the factory, large doorways or openings with plastic strip curtains are used. Without sub-division or compartmentalisation by fire resistive materials, fire can travel unimpeded throughout the building.

A contributory factor in the loss of industry premises is the widespread use of insulated composite panels. Materials such as polystyrene melt at relatively low temperatures, which can result in the collapse of a building from the roof down.

Construction in the industry is generally driven by cost, thermal properties and hygiene. This generally results in the use of light materials, often of a combustible nature, such as sandwich panels with foamed content: polystyrene, polyurethane or polyisocyanurate. All of these burn readily and give off extensive volumes of thick, toxic smoke. They also aid rapid fire spread, with correspondingly high temperatures. The residue, when it cools, has the appearance of thick caramel and is of a tough consistency with extremely corrosive properties, even on stainless steel. Due to the nature of this construction, internal fire separation is not generally practical, giving rise to high PMLs (Probable Maximum Loss) in both PD (Property Damage) & BI (Business Interruption).

Such panels may be frequently used in the external building construction, as well as internal partitioning. Foam of one type or another is invariably used as insulation on freezers but can be replaced as an insulation for chillers, as they do not require such a low temperature to be maintained.

Retrofitting combustible panels with non combustible alternatives such as mineral wool or glass fibre can be a problem, as the panels have to be a lot thicker and consequently heavier to give the same thermal properties. This, in turn, can involve strengthening or replacing the existing supporting steelwork. Because such replacement panels are thicker, there can also be problems with available space. For example, to replace a two-inch thick polystyrene panel may require a mineral wool panel of at least six-inches.

### Process

The process hazards are equally varied and include:

- **Explosion** – from storage and use of flour and sugar in silos as well as grinding or pulverizing processes which produce dust accumulation from organic materials. This may also occur in hoppers, silos, conveyor systems, storage bins etc. The dust may accumulate on building fixtures and fittings such as steelwork, ledges and plant and machinery. Regular housekeeping and vacuuming schedules are imperative to minimise dust build-up. Explosions generally have two stages: the first explosion kicking the dust up into the air and spreading it into a cloud. This creates the fuel for the second, much greater explosion.

- **Static electricity** – produced in hoppers etc. by the movement or transfer of materials, can represent the ignition source for the explosion.
- **Thermic oil** – used as a heating medium to heat cooking oil via heat exchangers. This is frequently used in a closed loop, under pressure and may be heated above auto ignition temperature.
- **Cooking oil** – if allowed to get too hot in deep fat fryers can auto ignite.
- **Extraction systems** – which allow an accumulation of oil, fat, dusts etc. if not subject to a regular and thorough cleaning cycle.
- **Ovens** – directly or indirectly fired by gas, can represent an explosion hazard, particularly if the purge cycle is not correctly monitored in older plant.
- **Flammable liquids** – may be used either as ingredients in the process or for cleaning purposes, with resultant hazards from possible vapour explosion.
- **Refrigeration systems** – often use ammonia, in quantity, as a refrigerant which can cause an explosion hazard. It is also toxic and a contaminant.
- **Conveyor systems** – pass through hot cooking oil to transport foodstuffs such as potato chips, corn chips or flash fried food which will only be partially cooked for ready meals. In the event of power failure to the conveyor the product may remain in the hot oil for too long, causing ignition. Disposal of hot ‘crumb’ from conveyor cooking systems is a hazard in itself, until safely disposed.
- **Plastic materials** – many processes now involve the use of plastics, such as plastic bottles in the soft drink industry. These start with small ‘PET’ bottles, which are heated and blown to full size, cooled then filled with the product, which may be spring water, soft drinks etc. Plastics are also used as storage media in plastic trays, plastic boxes etc.
- **Plastic bags** – used for products such as potato chip manufacture – on a roll of material and heat sealed after filling – can lead to fire if not closely monitored.
- **External storage** – combustible timber pallets or open-topped waste skips are a hazard if stored too close to the building line, where fire can readily spread to the main building. In a fire timber pallets stored externally can also collapse against the building wall. If the wall is of profile asbestos cement and readily broken, fire can spread immediately inside the building or warehouse.
- **Fluid bed dryers** – present fire and explosion hazards.



## Business Interruption (BI) and Contingent BI considerations

The Achilles heel of food and beverage establishments is that, after any fire, the business must get back to day-one status before re-commencing production. Whilst an engineering business can start manufacture after a loss, even with tarpaulins covering holes in the roof or walls a food enterprise must be in pristine condition from a hygiene point of view, before production re-commences. In many instances, therefore, the BI claim will greatly outstrip the PD claim.

EC rules and regulations can further complicate matters. For example, in the bottled spring water industry, the spring/bore hole is generally on site, with bottling adjacent. To maintain brand name, under EC rules, the water must be bottled at source. So after fire damage to a bottling plant, it is not an option to tanker the water off site to be bottled under sub contract.

## Industry trends

This industry is one of the few which remains ‘home based’ and not outsourced abroad. The products may be imported but the processes and packaging are still largely local. Developments include:

- Availability of new, alternative products to combustible composite panels, such as mineral wool
- Much improved quality control in manufacture of PIR panels, which increase heights in warehousing, for multiple storage racking
- Increased use of plastics and of computers in all aspects of manufacture and storage
- Increased use of chilled and frozen processes, such as blast freezing and spiral freezers
- Resistance to installing AFA (Automatic Fire Alarm) in all areas
- Reluctance to install sprinklers for hygiene reasons
- Reduction in on-site storage of raw materials and packaging largely for cash-flow reasons.

## Requirements and Recommendations

Where necessary, local codes should apply, such as BS, LPCB, NFPA and FM.

The following bullet points address the main hazards in no particular order:

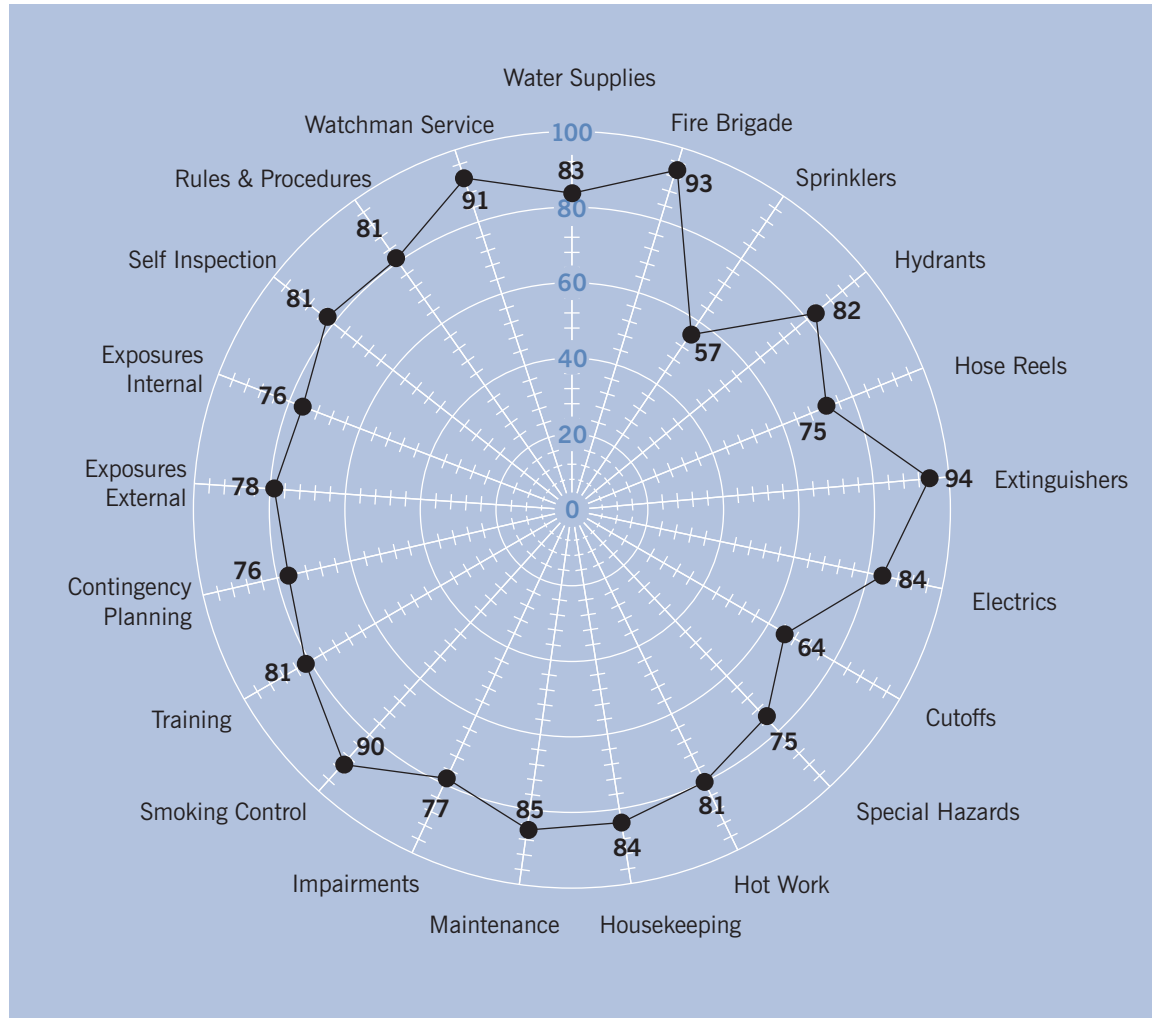
- A health and safety policy statement should be formulated and displayed
- A fire risk assessment should be carried out, in order to identify the fire hazards and to determine the action required to reduce the risk to an acceptable level
- Consider installing sprinklers to local codes. In some instances, regardless of location, FM/NFPA codes may be best applicable
- Flour and sugar silos should have explosion venting direct to the atmosphere and earthing points/clips provided for tanker unloading
- Process plant and ducting involving flour and sugar should be fitted with explosion relief facilities
- Gas fired ovens should have unobstructed blow-off panels or explosion venting
- Regular inspections should be carried out of the workplace to identify common hazards, such as trailing electrical leads etc
- External storage of combustible materials, such as plastic crates, idle timber pallets and combustible waste, should be kept well clear of the outside of the building in an area with enhanced security and lighting
- Fixed electrical systems should be inspected by a qualified electrical contractor at least every three to five years
- All portable electrical appliances should be tested annually, by a qualified electrician and records retained, in accordance with the Electricity at Work regulations
- All heaters should be kept clear of combustible material
- Storage in manufacturing areas should be kept to a minimum
- Warehousing and production areas should be fire separated
- Combustible composite panels should be replaced with non combustible alternatives
- Where combustible panels are already in place, they should be subject to regular inspection to ensure the continuing integrity of facings. Any holes should be capped in metal
- Where electrical cabling passes through combustible paneling, the cabling should be sheathed, with protective grommets at either end
- The public fire service should be made aware of the presence of combustible cored panels on site
- Waste should be removed from the premises each night
- To ensure early alarm and minimum contamination, automatic smoke/heat detection should be installed, with the alarm transmitted off site
- Dry-powder extinguishers should not be located in food preparation or handling areas
- Key personnel should be given basic training in the correct use and application of hand operated fire extinguishers
- The emergency power isolating switch or gas isolator for fat fryers should be positioned away from the equipment and towards an exit
- Thermic oil should be subject to regular sample testing, at least once every three years. An overflow containment vessel should be provided from the expansion tank, preferably located outside
- The "Wanson" boiler for thermic oil should be inspected at least annually. The operating temperature for the oil should not exceed the manufacturer's specification
- The boiler should be in a fire separated compartment with a minimum two hours fire resistance
- Any fire doors should be held on a magnetic catch, released on operation of a smoke detector or fire alarm
- The waste from fat fryers should not be stored in plastic containers and should be removed from the premises each night
- Fat fryers should be protected by automatic CO<sub>2</sub> extinguishers with back up in case of re-ignition.
- Fat fryers should preferably be in fire-separated compartments with manual gas release mounted externally
- Ducting containing fat or grease should be cleaned at regular intervals and extract ducting deep cleaned at least annually
- Filters should be regularly replaced or cleaned
- Where flammable liquids are used, they should be dispensed from purpose-built safety containers and an external bulk store provided. For storage in the production area or laboratory, a purpose built and identified storage cabinet should be provided
- Battery charging should be carried out in a well ventilated area and well away from any combustible cored panels
- A comprehensive Business Continuity Plan (BCP) should be put in place, updated at regular intervals and tested at least once every three years, under different scenarios. The BCP should, preferably, be web based. If not copies must be kept off site
- A digital photographic record should be made of the entire plant with copies included in the BCP.



## Industry Benchmarking

**Outer circle** represents best industry practice.

**Black line** represents the global average of ACE inspected food & beverage operations during a period of five years.



## Industry Loss Information

Source of Ignition	Point of Origin	Location	Date	Total Loss
Deliberate	Canteen/Restaurant: Location – Other Buildings	Cambridgeshire	2008	£450,000
Chimney	Roof Space: Location – Dwellings	Lincolnshire	2008	£237,000
Deliberate	External Fittings: Location - Other Buildings	Sheffield	2008	£350,000
Deliberate	Unknown: Location – Other Buildings	Tyne and Wear	2008	£550,000
Deliberate	Canteen/Restaurant: Location – Other Buildings	Merseyside	2008	£106,000
Deliberate	Canteen/Restaurant: Location - Other Buildings	Dorset	2008	£410,000
Cooker including oven	Kitchen: Location – Other Residential		2008	£180,000
Electrical Fault	Bar/Canteen/Restaurant/Mess: Location – Other Residential	Berkshire	2008	£500,000
Cooker including oven	Kitchen: Location – Other Residential	London	2008	£180,000
Unknown	Unknown: Location – Dwellings	Worcestershire	2008	£185,000
Electrical Fault	Unknown: Location – Other Buildings	Cheshire	2008	£350,000
Deliberate	Unknown: Location – Other Buildings	London	2008	£112,000
Electrical Fault	Canteen/Restaurant: Location – Other Buildings	Bucks	2008	£241,000
Unknown	Shop floor/showroom/display hall: Location – Other Buildings		2008	£206,000
Unknown	Canteen/Restaurant: Location – Other Buildings		2008	£791,905
Cooker including oven	Kitchen: Location – Other Residential	Suffolk	2008	£600,000
Cooker including oven	Unknown: Location – Other Buildings	Cambridgeshire	2008	£265,000
Electrical Fault	Boiler Room: Location – Other Buildings	Birmingham	2008	£1,935,000
Smoking materials	Corridor/hall: Location – Other Buildings	Avon	2008	£100,000

## ACE Contacts in your region for further information

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\*G – Denotes Global Product Champion

## Reference Sources

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[www.hse.gov.uk/foi/internalops/fod/oc/500-599/520\\_19.pdf](http://www.hse.gov.uk/foi/internalops/fod/oc/500-599/520_19.pdf)

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### **ACE Global Engineering Network**

The ACE Global Engineering Network creates strong, long term relationships with clients, focusing on cost effective and proficient solutions to their risk management challenges.

Through in depth loss prevention training backgrounds and industry expertise, ACE engineers are experienced in evaluating a wide variety of risks and complexity of exposures.

Our specialist team is driven by account and field engineers delivering high quality and effective loss prevention services. We have engineers in key strategic locations around the world who are familiar with international standards as well as local codes and work practices. This proves invaluable in helping clients establish and maintain operations in traditional and emerging markets.

For further information please go to: [www.aceagen.com](http://www.aceagen.com)