



FIRE RISK EVALUATION IN INDUSTRY

Risk improvement and fire safety control methods cannot be achieved without having identified potential problem areas. A good deal of information can be gleaned from national fire statistics which can provide a base from which to start since effective risk evaluation needs to be systematic. Fire statistics are published regularly by the FPA.

In addition some research should be carried out to collate statistics on the factory's past fire experience. This can be achieved by reading insurance and accident reports, maintenance cards and also extracting information from senior staff regarding past incidents.

Depending on the comprehensiveness of this study it should be possible to establish where the factory's shortfalls are. Also, management should be consulted to establish which fire losses would cause the most serious production interruption.

Production

Everything mentioned in this bulletin relates either directly or indirectly to production. Good production giving healthy profits provides funds for better overall safety.

Production could be seriously affected by fire involving any of the following:

Raw materials

Essential materials which would be extremely difficult to replace at short notice, should be thoroughly protected against fire and segregated from production and workshop areas.

Fuel supplies

Unskilled handling or interference with these commodities, even with the best of intentions, can introduce serious fire hazards. Storage and safe handling of fuels should comply strictly with safety regulations. The issuing and handling of fuels must be tightly controlled and operators of fuel utilising equipment need special training in safe precautions and emergency procedures. The security of liquid and gas fuels should not be overlooked.

Records

Records such as those relating to the organisation of an establishment and giving direct evidence of legal status, ownership, accounts receivable, etc, are of extreme importance. Since most records are combustible, complete protection is not always feasible and therefore efforts should be directed towards reducing the consequences of loss by preparing duplicates.

Records storage and protection is varied and should be based on an inventory that determines type, volume, rate of acquisition and disposal and importance.



Computers

Computers are widely used in industry and commerce for such applications as the preparing of salaries and wages, stock levels, project research and the control of special process plants. An extensive system may represent an investment of several million Rands and the consequential losses resulting from computer damage, when used in process control for example, could be very serious.

Computers are highly susceptible to damage by fire and therefore should be located in an area cut off from other portions of the building by adequate fire resistance rated walls, floors and ceilings. Other important factors are the choice of materials used in constructing computer suites, the provision of adequate fire-fighting equipment and the training of staff.

Technical equipment

Most industries have one or more items of machinery or equipment which are vital to overall profitability. Fire damage to one of these could bring the whole factory to a halt. Important preventive factors in these cases would be the establishment of pre-planned maintenance schedules and the on-going training of operators.

Essential services

Industries generally cannot do without electricity, air conditioning and other services of prime importance to the process.

Electricity

The following are some common faults found during inspections of electrical systems.

- Service equipment dirty or obstructed by storage, wires overloaded and not properly grounded.
- Bare or badly deteriorated wiring.
- Conduits and cable trays not correctly fastened or incorrectly secured to cabinets.
- Flexible cords, used in place of an approved method of wiring are often badly frayed and plugs are not properly secured in sockets.
- Conductors not properly joined and taped, overloaded and not protected from physical damage.
- Inadequate covering of junction boxes or electrical cabinets adjacent to combustibles.
- Incorrect fuses or circuit breakers.
- Overloading of motors not designed for a particular function
- Switchers not properly wired, badly deteriorated and of insufficient capacity.
- Switchboards with live parts exposed and not protected against moisture.
- Rheostats not isolated from combustibles.
- Motors, appliances, wiring systems in hazardous locations not of an approved type.

Many of these problems could be avoided by introducing an efficient maintenance schedule.



Air conditioning

Air conditioning systems involve heat, refrigeration, filters, air washers, air dryers humidifiers, fans and motors, all of which present fire problems.

An inspection should be made of the entire system from intake to outlet, taking particular note of vertical and horizontal ducts which pass through walls and floors. Attention should be directed, for example, to the following:

- The air-conditioning plant should be segregated from the rest of the building.
- No combustibles should be stacked at or near the fresh air intake. If there is chance of a fire near the intake (grass fire or sparks from incinerators etc) smoke detectors linked to fire dampers should be considered.
- An early warning smoke detection system should form part of the protection equipment for the installation. The activation of a detector could be expected to shut fire dampers in the fire zone, stop supply fans, raise the alarm, indicate on an annunciator panel, actuate extinguishing equipment etc.
- Fire dampers should be fitted into trunking wherever it passes through dividing walls and floors.
- Non-combustible fire stopping should be used as a fire seal where trunking passes through building divisions.
- Check for combustible inner and outer trunking insulation materials which could act as a fuse and spread the fire from one area to another.
- Depending on the importance of air conditioning to the process an independent power supply may be necessary.
- Escape corridors used as return air plenums could prove disastrous in the case of a fire.

Fire load

The amount of combustible materials including combustible finishes within the building is known as the fire load and may seriously add to the severity of a fire. Improper storage, poor stock subdivision and stock piled too high, are all significant contents features which could add to the hazard.

The following table gives examples of contents which can be expected to affect the spread of fire within a building:

Materials capable of spreading and intensifying the fire

Solids	Liquids	Gases	Those which burn fiercely	Those which melt & flow	Those which explode
Finely divided dusts, powders, fluff, cuttings, loose and thin paper, plastics film, cloth, foamed plastics and rubbers, fibre board	Acetone, alcohol, petroleum products, adhesives, lacquers, paints	Acetylene, butane, hydrogen, propane, town gas	High flash-point liquids, rubber, some plastics	Bitumen, waxes, rubber, naphthalene, fats.	Explosives, gas cylinders, drums, tins and aerosols, dusts



Factory building

An incorrectly designed and constructed building could have as much of an effect on the development of fire as the fire load. The following points would assist in minimising flame spread and the overall effects of fire:

- Sub-dividing by means of rated fire-resisting walls and floors will stop fire spreading from one section to another and will also safeguard the occupants.
- Flammable liquids and chemicals stores, computers and other important equipment should be segregated from other risks.
- Openings due to building services such as door openings, staircases, lifts, air conditioning ducts, should be correctly designed and sealed with a fire stopping.
- A careful selection should be made of materials used in construction so as to avoid the use of those with high flame spread properties and those which produce toxic fumes.
- Since the weakening of unprotected steelwork can contribute to an early collapse of walls and floors in a fire situation, protection of structural steel work should be considered.

Housekeeping

The importance of cleanliness and tidiness in effective fire prevention cannot be overstressed. Accumulation of rubbish and waste materials provides tinder for fire ignition. Many fires are caused by indiscriminate burning of waste in an improvised or haphazard manner. Consider the following precautions.

- Combustible materials must be separated from sources of ignition.
- Metal containers with lids are necessary for the collection of waste. They should be cleared daily or more frequently.
- Waste containers should be sited so that accidental ignition will not endanger personnel, plants buildings or stock.
- Separate containers should be used for chemically incompatible waste materials and containers should be marked accordingly.
- A properly designed incinerator or an area designated and maintained solely as a burning area well clear of fire hazards areas should be provided.
- Vegetation in storage areas should be controlled.

References:

1. Hazard Assessment, Hazard No. 20. Royal Insurance Company.
2. National Fire Protection Association Inspection Manual, 4th Edition.
3. FPA (UK) Compendium, Fire Safety Data, Vol. 6 Fire Prevention Design Guide No. 7
4. AJ Lightbody, "Fire safety and the plant fire officer", Fire Protection September 1981

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