**FIRE PREVENTION AND FIRE PROTECTION**

The PREVENTION of fire is as important as the development and implementation of FIRE PROTECTION systems (e.g. fire detectors, alarms, extinguishers and evacuation procedures). To this end Building Wardens*,* and all other building occupants, should recognise the need to avoid dangerous practices that increase the risk of fire.

**Fire prevention** refers to activities directed towards the control of one or all of the three factors simultaneously necessary for a fire outbreak:

* Oxygen (e.g. air or an oxidant chemical);
* Fuel (e.g. combustible solids, flammable liquids); and
* An Ignition source (e.g. flame, spark, heat).

To avoid the outbreak of fire, and to be able to react effectively if a fire occurs, the following housekeeping standards are recommended for adoption by Building Wardens in their *Budget Unit:*

* regular removal of combustible wastes;
* regular removal of redundant or broken equipment and furnishings;
* heaters situated away from combustible materials;
* discharged or out of date fire extinguishers reported to the ANU Fire Safety Officer;
* maintain egress routes clear of obstructions; and
* Fire doors and smoke doors kept shut, except during use or when held open by approved automatic release devices.

1. ***The following are considered elements of good building design and good fire services:***

* A fire alarm system and emergency warning system;
* Fire rated floors, ceilings, and walls within the building;
* Fire doors and smoke doors;
* Unobstructed and wide egress routes;
* Exit signs that are easily recognizable; and
* Fire extinguishers and hose reels sited correctly, clearly marked and accessible.

1. ***The following are considered the minimum controls to be implemented for the usage of flammable liquids:***

* A minimum of supplies at each work station;
* No excessive storage of flammable liquids onsite; and
* Safety containers of suitable capacities used for dispensing and internal movement of flammable liquids.

1. ***Control of ignition sources:***

* **Smoking** is no longer allowed on the Acton campus as the ANU has now implemented a smoke-free environment policy, and therefore smoking should not present a risk in hazardous areas. Smoking is the second most common causal factor of industrial and commercial fires.
* **Open flames and candles** are prohibited in all processes and areas unless specifically needed for authorised work practices. The use of open flames shall be supported by a completed risk assessment and appropriately identified risk controls.

1. ***Well-maintained electrical system and equipment:***

* Implementation of the University’s procedures for Electrical Safety

1. **Control over work processes that produce heat or sparks**.

* Appropriate control measures identified and implemented to mitigate the risk from processes that generate heat or sparks.

**Fire protection** refers to the provision of effective means for:

* Automatically notifying building occupants and ACT Fire & Rescue of the presence of a fire in the building;
* Controlling the rate of spread of the fire and the smoke generated;
* Extinguishing the fire at its incipient stage; and
* Safe evacuation of building occupants.

1. ***Fire alarm systems***

The *fire alarm system* provides automatic notification to building occupants and to ACT Fire & Rescue of the presence of a fire in the building. Such systems are made up of fire detectors positioned throughout the building and wired to the *fire indicator panel* and *fire bell*. When a detector is activated, signals are sent automatically to notify ACT Fire & Rescue, turn off fire door electromagnets, switch the air-handling system to fire-emergency mode, and start *the emergency warning system* in the building.

* **Fire detectors** are designed to detect one of the two characteristics of a fire - heat or smoke:
  + Thermal (or heat) detectors react only to temperature. They are activated by a rapid rate of temperature increase or when a predetermined temperature is reached (such as in some sprinkler systems).
  + Smoke detectors react to the smoke (very small particles of unburnt carbon) that is present in any building fire. Smoke detectors are generally sited adjacent to fire and smoke doors and within the building air handling system.
* **Emergency warning systems** are manual systems that provide the audible alarm signals used to alert building occupants to the presence of a fire and to assist their orderly evacuation from the building. Generally two-stage systems are used:
  + The ALERT signal - repetitive 0.625 second interrupted sound of 420 Hz frequency “beep – beep – beep” - sounded automatically on actuation of the *fire alarm system.*
  + The*Building* *Warden* manually activates the EVACUATION signal - repetitive signal of rising frequency 500 Hz - 1200 Hz “whoop – whoop – whoop” - if required.

1. ***Controlling the rate of spread of the fire and smoke hazard:***

* **Fire rating of building materials and design.** The structural members and major partitions in buildings are designed to resist fire (i.e. stop it penetrating) for a given duration of time (e.g. 4, 3, 2, 1.5, 1, 0.5 hours).
* **Fire doors and smoke doors.** Fire doors are fire-rated (when closed). Smoke doors are not fire-rated but provide the very important function of limiting the spread of smoke.
* **Air handling system in fire-emergency mode.** During a fire-emergency the building air-handling system will switch to one of three fire-emergency modes:
  + Complete shutdown;
  + Exhaust mode (full exhaust, no recirculation, no fresh air); or
  + Smoke mode (full exhaust, full fresh air, no recirculation).

1. ***Extinguishing the Fire in its Incipient Stage:***

* **Sprinkler systems.** This type of system is a network of pipes plumbed throughout the ceiling(s) of the building that carries water from the mains to small, heat-sensitive sprinkler heads. When heat causes the sprinkler head to reach a certain temperature, a glass bulb or metallic link is broken and water is discharged onto the fire in a spray pattern. The flow of water through the sprinkler system activates the *fire alarm system.*
* **Fire extinguishing equipment.**
  + Hydrant systems are arrangements of piping with outlets for the connection of large diameter hoses; for the use of ACT Fire & Rescue or properly trained fire-fighting teams only;
  + Hose reels consist of a length of non-kinking tubing with a nozzle attached. They are permanently connected to the water supply and may be used by *Building Wardens*;
  + Fire blankets; and
  + Portable fire extinguishers.
* **Portable fire extinguishers containing:**
  + Water;
  + Foam;
  + Carbon dioxide;
  + Dry chemical powder;
  + Wet Chemical; and
  + Vaporising Liquid