

# Photocopiers

Photocopiers, laser printers and facsimile machines are essential pieces of equipment in the modern office. These machines seem harmless enough but there are problems associated with their use and precautions should be taken to protect the health of workers.

Plain paper photocopier operate by reflecting light from the original item so that an image is projected onto a 'photoreceptor', which is an electrically charged drum or belt. The surface of the drum is photosensitive; it loses the electrostatic charge when exposed to light. Reflected light produces a pattern of charges on the drum or belt and leaves a latent image. The electrostatic charge attracts the toner and reproduces the image permanently onto the paper by heat and pressure.

Colour copiers use the same basic electrostatic processes. However, they have three toner systems, incorporating the primary colours green, red and blue.

## Main hazards

### Ozone Gas

Ozone is an unstable form of oxygen, which may be formed during the photocopying process. Ozone is produced by the operation of high voltage equipment such as photocopiers, x-ray equipment and electric arc welding.

Ozone is a reactive, unstable gas with a half-life of six minutes in office environments. It is a highly toxic gas and is the most serious health risk from photocopiers. Ozone has a sweet smell that can normally be detected at concentrations of 0.01 to 0.02 parts per million (ppm). The permissible exposure level currently accepted in Australia for ozone is 0.1 ppm as a time-weighted average over the working day.

When photocopying, the majority of ozone is produced during the charging and discharging of the drum and paper - it is the breakdown product of the drum material during image transfer. Ozone is also produced by ultraviolet emission from the photocopier lamp.

### Health Effects

As ozone usually rapidly decomposes back to oxygen, the normal concentration of ozone around photocopiers is not sufficient to cause symptoms. The rate of decomposition is dependent on time, temperature (the gas breaks down more rapidly at a high temperature) and contact with various surfaces.

However, ozone concentration can build up if the room

has insufficient ventilation. If ozone concentration reaches 0.25 ppm or above, this odorous gas can cause irritation to the eyes, the upper respiratory tract, and the lungs, throat and nasal passages. Other symptoms include headache, shortness of breath, dizziness, general fatigue and temporary loss of olfactory sensation. A level of 10 ppm is immediately dangerous to life and health.

Prolonged inhalation of ozone levels of a few parts per million is known to damage the lungs. Some authorities suggest that a concentration of 0.1 ppm might have the effect of causing premature ageing and shortened life span.

### Toners

Powder form toners are used in 'dry' copiers and are made up of various formulations of carbon black. They generally comprise approximately 10% carbon black, which is dispersed in a heat sensitive polystyrene acrylic or polyester resin. The fine toner powder can be released from copiers, particularly if they lack a contained toner system and automatic shut down devices on waste toner compartments. Toner powder can also be spilt during maintenance or when refilling the drum.

### Health Effects

Toners dust may irritate the respiratory tract, resulting in coughing and sneezing. Some toners contain certain compounds such as nitropyrenes and trinitrofluorene. These compounds, although rarely found in today's toners, have carcinogenic properties, therefore skin contact and inhalation is to be avoided. This can be achieved by the provision of toner in cartridges that can be fitted

directly to the copier. Where a risk of skin contact or inhalation exists, workers handling cartridges must be provided with disposable gloves and facemasks.

The polymer-type plastic resins that are found in many photocopier toners are known to cause allergic reactions on repeated skin contact. The symptoms include skin rashes and burning sensations in the eyes.

## Noise

High-speed copiers and copiers that collate in addition to their other functions have the potential to be noisy. Older type existing copiers can reach noise levels above 75dB(A) and large multiple copying machines operate at 80dB(A). A more appropriate noise level for office areas due to the nature of office work would be less than 60dB(A).

### Health Effects

The noise from photocopying operations (especially those that are continual), can cause irritation and stress to nearby workers and disrupt concentration. In the press and printing industries noise is a major hazard for workers and can lead to temporary hearing loss or deafness and tinnitus, or ringing in the ears.

## Ultraviolet Light

Fluorescent, metal halide or quartz exposure lamps are most commonly used in photocopiers. The light is not regarded as harmful, however, it can lead to eye strain when encountered repeatedly – photocopying should always be carried out with the cover down.

### Health Effects

The intensive bright lamps used in photocopiers may cause eye irritation and headache after imaging, if viewed directly. In addition it can be irritating and stressful to nearby workers.

## Other Hazards

### Heat

Heat is generated during the photocopying process. If ventilation and heat dispersal is not adequate, it may cause a significant temperature rise in the room, which may cause discomfort to workers.

Burns from hot components are also a potential hazard when clearing paper misfeeds or jams.

### Muscle Strain

Long periods spent photocopying or collating in a poorly designed work area can cause musculoskeletal discomfort and strain. Sustained and repetitive postures may lead to muscular fatigue and pain.



## Working safely with photocopiers

### Ozone

- Choose a low ozone emission photocopier or one that has an activated carbon filter fitted to the exhaust of the machine. Activated carbon will provide 100 per cent decomposition given sufficient contact with ozone.
- Maintain the photocopier and filter regularly. Good maintenance can reduce the levels of ozone produced.
- An objectionable odour or smell from photocopiers can cause nose and throat irritation. The indoor air quality should be monitored on a regular basis.

### Maintenance

- Always use the photocopier according to the manufacturer's instructions. If in doubt consult the handbook. Use only the specified type of toner, paper and acetates.
- Photocopiers should be installed according to the manufacturer's instructions, with sufficient space and airflow around the machines.
- The manufacturer's recommendations for cleaning, as well as filter and brush replacements should be diligently followed.
- A maintenance log should be kept for each machine and should be available to staff for inspection.

### Ventilation

- An adequate ventilated area can facilitate safe removal of any dusts, gases or vapours.

- Locate the copier in a well-ventilated room with natural fresh air or a filtered air exhaust system. Allow space around the machine for good airflow (an enclosed room may need mechanical ventilation conforming to Australian Standard AS1668).
- Air movement in copying areas should be monitored regularly.

## Intensive light or heat

- Keep the document cover closed at all times during photocopying, as this prevents light leakage and avoids visual fatigue.
- Where possible, prevent light exposure by using the automatic document feeder during photocopying.
- If it is not possible to close the cover for an unusual job, the operator should avert their eyes from the light source.
- Hot machine components can pose a hazard to employees opening equipment to clean paper jams. To avoid accidents non-metal tongs can be used to remove paper after first ensuring that the machine is switched off.
- When it is necessary to remove jammed paper from hot components, switch off the copier and allow a few minutes for cooling.

## Chemicals

- Material Safety Data Sheets (MSDS) should be available to all staff for any chemicals used and can be obtained from your supplier or service contractor. The MSDS has information on handling, storage and toxicity of the chemicals used and provides the health and safety information needed to identify and assess hazards.

- Use contained toner systems and automatic shut down devices on waste toner compartments.
- Disposable rubber gloves should be made available and should be worn when handling chemically treated papers or wet-process chemicals, cleaning up and disposing of spilt fluids or spent toner, to avoid contact with skin.
- Spilt fluid or spent toner should be placed in sealed plastic bags marked 'chemical waste'.
- If manual toner transfer is necessary, an optimum system of transfer should be developed and used to minimise the chance of spillage.

## Noise

- Locate the machine in an area where the effect of noise will be minimal. It may be necessary to achieve this by screening the photocopy machine with sound absorbent material/panels.

## Manual Handling

- Establish a clear work area around photocopiers, separate from any walkway or emergency exit route.
- The working surface of photocopiers should be at a comfortable height for operators and a collating table should also be provided.
- Adequate storage facilities must be provided for paper and toner. To prevent musculoskeletal injuries, store boxes of photocopy paper at knee height rather than floor level to make lifting and carrying easier.
- Tasks should be rotated to avoid sustained and repetitive postures.

**Any ill effects that may be attributable to a photocopying machine should be reported to the Safety Officer.**

**For further information and advice contact the Workers Health Centre**



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