

# Photocopier and laser printer hazards

*Photocopiers and laser printers are safe when used occasionally and serviced regularly. But if they are badly sited, poorly maintained and used frequently or for long runs, there are risks to health, ranging from irritated eyes, nose and throat to dermatitis, headaches, premature ageing and reproductive and cancer hazards. Proper ventilation and maintenance are essential in eliminating hazards.*

## The chemicals

### Ozone

Ozone is a gas produced during the high voltage electrical discharge in photocopiers and laser printers. It is sweet smelling and highly toxic with a UK Workplace Exposure Limit (WEL) of 0.2 ppm (15 minute reference period). If you can smell ozone the levels are too high. Ozone is neutralised in the air quite quickly though this can be slowed by high humidity, temperature and some effects of office furnishings. Health effects are eye, nose, throat and lung irritation, dermatitis, headaches and nausea, premature ageing and potential reproductive dangers. Pruritus, a kind of itching occurs on the face, neck and areas of skin exposed to ozone. There are also concerns about long term, low level exposure which can cause sensitisation and possibly other health problems. When mixed with nitrogen oxide in certain proportions it can have an effect on the central nervous system.

### Volatile organic compounds (VOCs)

VOCs are also emitted during photocopying. These can contain traces of decane (carcinogenic), 1,1,1-trichloroethane (can cause skin irritation), iso-octane, toluene (causes

fatigue, drowsiness, throat and eye irritation), xylene (can cause menstrual disorder and kidney failure) and benzene (carcinogenic and teratogenic).

### Selenium and cadmium sulphide

Some copiers use a drum impregnated with selenium or cadmium sulphide. The gas emitted from these materials especially when hot can cause throat irritation and sensitisation (i.e. adverse reaction to very tiny quantities of chemical) to exposed workers. Short term exposure to high levels of selenium by ingestion causes nausea, vomiting, skin rashes and rhinitis. The UK WEL for selenium compounds is 0.1 mg/m<sup>3</sup> (over an 8 hr reference period). This is more a risk to maintenance staff when cleaning or grinding the surface of the drum. Cadmium compounds have a WEL of 0.025 mg/m<sup>3</sup> (over an 8 hr reference period).

### Nitrogen oxide

May be produced when there is a spark in electrostatic photocopiers. Symptoms are similar to those produced by carbon monoxide.

### Carbon monoxide

Is produced when toner (containing carbon black) is heated in an inadequate air supply. Some copiers can reach half the WEL in well ventilated rooms. In poorly ventilated conditions the effects include headaches, drowsiness, faintness and increased pulse rate. Carbon monoxide can cross the placenta and affect the unborn child. The WEL is 30 ppm (8 hour ref period).

### Toners

Toners are generally a mixture of plastic resin and carbon black often with other additives. Carbon black is classified as a nuisance dust (ie is only mildly toxic in itself) but will contain impurities known to be carcinogens. Toners should be handled with care, protective gloves should be worn, and dust release

minimised. Contact with the tongue, e.g. by touching copied papers with a wetted finger can lead to small growths on the tongue. Other health effects may be irritated eyes, headache and itching skin. Maintenance workers are at risk from repeated exposure which can lead to skin and eye sensitisation.

### Airborne toner dust

A recent study by the Queensland University of Technology in Australia has raised concerns about very small particles of toner from a number of laser printers that can become airborne and penetrate deep into the lung. It showed that almost a third studied emit potentially dangerous levels of toner into the air although they found 60% emitted no particles at all. While the research is limited in its scope it may prove useful when considering purchasing new equipment or reviewing the performance of old laser printers (see reference below).

## Other hazards

### Ultraviolet light

Photocopier lids should be kept closed when the machine is in use. Ultraviolet light can cause eye irritation and burns.

### Noise

Can reach up to 65dB(A) for ordinary copiers. Care should be taken in separating copiers with noisy collators or siting them as far from workers as possible.

### Fire

Excessive dust in electrical equipment will cause sparking. Provision of carbon dioxide extinguishers near machines is essential.

### Jams

Even though most machines cut out when opened, they should be switched off before removing jammed paper. Avoid hot surfaces and wash hands immediately afterwards.

## Laser printers

Laser printers are often placed on desk tops beside workers and they produce ozone like conventional photocopiers. Thus there must be regular checks on filters which may need to be replaced as often as once a month. Tests on the efficiency of filters under factory conditions on new machines do not take into account deterioration under heavy use in the workplace.

## LEV

LHC is unaware of any Local Exhaust Ventilation (LEV) systems for copiers or printers currently on the market. LEV would be the best option if available as it would take the offending gasses from where they were generated and pump them into the general atmosphere outside the workplace. It is because of this lack of availability we recommend dilution ventilation.

## The law

The Health and Safety at Work Act imposes a general duty on every employer to ensure the health, safety and welfare of all employees at work. This covers the maintenance of plant, the use, storage and handling of substances and the provision of information, instruction and training. The Workplace (Health, Safety and Welfare) Regulations state that an adequate supply of fresh air must be circulated in all workrooms. Rooms with no direct access to fresh air must be provided with mechanical ventilation.

The Control of Substances Hazardous to Health Regulations 1999 require employers to carry out an assessment of all chemicals on their premises – ensure that safety data sheets for all copier chemicals are obtained and all recommended precautions are taken.

## Action points

1. Preferably site photocopiers and laser printers in separate, well ventilated rooms. If this is not possible, then site them away from workers where good ventilation is ensured. Do not site busy laser printers on or next to workers desks.
2. Ventilation is crucial! Ensure that the area in which the machine is sited has a complete change of air every hour, that the exhaust vent is kept free of obstruction, and that no-one is situated next to the exhaust vent of the machine. If someone is employed specifically to operate copiers and printers it is essential to ensure the room is well ventilated. Machines should not be sited in clusters or in very small rooms.
3. Make sure copiers are regularly serviced and the filter replaced on a regular cycle. Servicing alone will only reduce chemical contamination for as short a period as a month if use is heavy. If the machine is old and faulty, get it replaced.
4. When maintaining the machine, adding toner etc follow guidelines such as wearing gloves. Hands and face must be washed immediately afterwards.
5. Vet new laser printers and photocopiers in advance – demand specific information on filter changing and servicing. Only accept machines with clear maintenance guidelines, health and safety instructions and easy change filter systems. If they cannot provide this information do not buy or accept the product. Demand the data from management and check the system is correctly installed.
6. Check health effects on people working with or near this equipment by carrying out a survey and investigate any complaints further, taking necessary preventative action. Symptoms should be reported in the accident book and medical tests taken when serious symptoms occur.

## Reference

*Printer particle emissions add up* [http://pubs.acs.org/subscribe/journals/esthag-w/2007/aug/science/nl\\_printers.html](http://pubs.acs.org/subscribe/journals/esthag-w/2007/aug/science/nl_printers.html)

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