HSE
Health and Safety Executive

MC0

Advice for managers

COSHH essentials for the microelectronics industry

The law applying to hazardous chemicals in microelectronics is the Control of Substances Hazardous to Health Regulations 2002 (COSHH), as amended.

This information sheet describes good control practice and is intended to help managers comply with the law and reduce the health risks from exposure to hazardous chemicals.

It is also useful for trade union and employee safety representatives.

This information does not cover decommissioning of equipment or major maintenance tasks.

Main Points
Controlling the risks from the use of hazardous chemicals in the microelectronics industry is the responsibility of employers, supervisors and managers.

Make sure you have made a suitable and sufficient assessment, and that you are:

- **controlling exposure adequately; and**
- **protecting employees' health.**

These sheets provide a summary of good control practice in the industry. When properly applied and followed, these control measures should provide adequate control of exposure.

Introduction

This is one in a series of advice sheets for the microelectronics industry.

MC0 Advice for managers
MC1 Wet etch processing
MC2 Chemical vapour deposition (CVD)
MC3 Dry etch processing
MC4 Molecular beam epitaxy
MC5 Photolithography
MC6 Ion implantation

The risks

Microelectronics manufacturing processes use a range of substances that may be very toxic, carcinogenic and asthmagenic.

These chemicals include arsine, dichlorosilane, hydrogen chloride, hydrogen fluoride, silicon tetrachloride, hydrogen, nitrogen, gallium arsenide, silicon nitride, indium, phosphorus and aluminium.

Action

COSHH risk assessments are a key part of ensuring worker safety by helping you assess the risks to your workers from hazardous process chemicals. Ensure a competent person carries out a risk assessment of all processes where exposure to hazardous substances could occur. This includes emergency measures for spillages.

If you are unsure of the potential for airborne exposure, you may need exposure measurements (see sheet G409 - see 'Further information').

Before acting, make sure the advice really fits your situation. Following all the advice in these sheets means that you will normally comply with your COSHH responsibilities for these tasks and any workplace exposure limits (WELs). You can use other measures as long as a suitable and sufficient risk assessment shows that they are equally effective, or shows that you can ignore a measure because a risk is absent.

Try to prevent the risk by eliminating the process, or substituting with safer products.

If you are unable to remove the risk, you must control exposure for routine and non-routine work activities. Look at all possible control measures; some are more cost-effective and practical than others.

Read the advice in each of the sheet(s) you download. Compare it with what you do now.

You may already have the right controls in place, but are they all working properly? When were they last checked? Are they always used when needed? Show that control is being sustained – keep good records.

You need to keep all controls in good working order. This means mechanical controls (eg dust or fume extraction), administrative controls (eg following rules) and operator behaviour (following instructions). Look at all aspects of the advice. Don't pick and choose - the points work together to provide 'adequate control'.

You should carry out health monitoring or health surveillance for workers - the individual sheets tell you which is appropriate.

If you are in doubt, seek expert help. Remember, just because this advice means that you have to change old working practices or spend money on new controls, that doesn't make it unsuitable! Decide how best to make any changes required 'across the board'. If you do need expert help, please don't give up. Ask your suppliers, trade association, trade union, or log onto www.bohs.org.

Information, training and supervision

Train your workers. Ensure they know the hazards of the materials they use. Include supervisors and managers in health and safety training. Training should include:

- using the controls correctly;
- how to check that the equipment is working properly;
- how to check that any extraction is turned on and working properly;
- how to follow safe operating procedures to minimise exposure;
- how to maintain and clean equipment safely;
- when and how to use personal protective equipment and how to look after it; and
- what to do if something goes wrong.

Remind workers to check any respiratory protective equipment (RPE) every time they put it on.

Supervise your workers. Check that they:

- use the controls provided;
- follow the correct work method
- are fully trained; and
- are following the rules on personal hygiene.

Contractors also need supervision. Check that they follow on-site regulations and that they are competent to undertake the tasks assigned. See INDG368 - see ‘Further information’.
For information on ‘first aid’ see: www.hse.gov.uk/firstaid/index.htm.

Facilities

Provide clean facilities: a washroom, showers, storage for clean and contaminated work clothing, and a refreshment area.

Provide pre-work skin creams and after-work moisturisers to replace skin oils.

Personal Protective Equipment (PPE)

Check safety data sheets and equipment maintenance procedures for recommended PPE and ask your supplier for advice.

Keep all PPE clean and replace as recommended.

Provide storage for PPE to prevent damage or contamination when not in use.

Do not alter PPE provided, and report faulty equipment immediately.

Respiratory Protective Equipment (RPE) should only be needed for non-routine, emergency or maintenance purposes and should be provided following a risk assessment (see sheet R5 or R6 - see ‘Further Information’. Users must be properly trained.

Cleaning and Housekeeping

Ensure the workplace remains clean. Clean plant and equipment in accordance with manufacturers’ schedule and procedures.

Provide containers for hazardous waste, including contaminated gloves, overalls and other PPE.

Ensure containers have lids and are labelled to prevent incompatible wastes being mixed.

Arrange disposal by specialist waste companies.

Maintenance of controls

Maintain the equipment, as advised by the supplier, in efficient and effective working order. See specific sheets for more detailed information.

Control Guidance

Four general categories of control approach are specified in the sheets:

- Control approach 1 is good working practice and general ventilation.
- Control approach 2 is good working practice with engineering control (extraction).
- Control approach 3 is good working practice and containment.
- Control approach 4 recommends that you consult an expert.

COSHH guidance sheets recommend the highest control approach that is reasonably practicable.

Environmental guidelines

Releases and wastes may be regulated within the Pollution Prevention and Control (PPC) framework. You should consult your local authority or the Environmental Agency.

In Scotland, consult the Scottish Environment Protection Agency (SEPA).

For more information, see www.netregs.gov.uk/netregs.

Employer's Checklist

- Can you eliminate or substitute the hazardous material? This is the safest option.
- Minimise chemical exposure risks; always provide appropriate engineering controls.
- Use controls correctly; implement all advice in the COSHH essentials sheets.
- Ensure controls are working properly. When were they last checked? Keep good records.
- Is exposure controlled adequately? You may need continuous monitoring or personal monitoring.
- Train and supervise your workers, including managers and supervisors.
- Provide clean facilities – washroom, showers, storage for clean and contaminated work clothing, and a refreshment area.
- Review risk assessments on a periodic basis. Revise assessments when making significant changes. Remember to include non-routine activities such as minor maintenance, spillage etc., as well as routine work activities.
- Due to the toxic and corrosive nature of some materials, you should plan and practice emergency procedures.
- Ensure your first aid procedures are adequate, and that employees understand them.

Further information

- *An introduction to local exhaust ventilation* HSG37 (Second edition) HSE Books 1993 ISBN 978 0 7176 1001 3
- *Respiratory protective equipment at work: A practical guide* HSG53 (Third edition) HSE Books 2005 ISBN 978 0 7176 2904 6
- *Maintenance, examination and testing of local exhaust ventilation* HSG54 (Second edition) HSE Books 1998 ISBN 978 0 7176 1485 1
- *General ventilation in the workplace: Guidance for employers* HSG202 HSE Books 2000 ISBN 978 0 7176 1793 7
- *COSHH a brief guide to the Regulations: What you need to know about the Control of Substances Hazardous to Health Regulations 2002 (COSHH)* Leaflet INDG136(rev3) HSE Books 2005 www.hse.gov.uk/pubns/indg136.pdf
- *Use of contractors: A joint responsibility* Leaflet INDG368 HSE Books 2002 (single copy free or priced packs of 10 ISBN 978 0 7176 2566 6) www.hse.gov.uk/pubns/indg368.pdf
- Other useful COSHH essentials sheets, available on www.hse.gov.uk/pubns/guidance/index.htm:
  - G409 *Exposure measurement: Air sampling*
  - R5 *Breathing apparatus with UK Standard Assigned Protection Factor 40*
  - R6 *UK Standard Assigned Protection Factor 2000 (APF 2000)*
- *Control of substances hazardous to health (Fifth edition). The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance* L5 (Fifth edition) HSE Books 2005 ISBN 978 0 7176 2981 7

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