

MC2

COSHH essentials for the microelectronics industry



This information will help employers comply with the Control of Substances Hazardous to Health Regulations 2002 (COSHH), as amended, to control exposure and protect workers' health.

It is also useful for trade union and safety representatives.

CVD is used to deposit thin films, such as polysilicon, silicon nitride or silicon dioxide, in low pressure quartz furnace tubes at temperatures up to 800°C.

The chemicals may include toxic substances, corrosives, carcinogens, and asphyxiants, such as: arsine; chlorosilanes; hydrogen chloride; hydrogen; and nitrogen.

This sheet describes good practice using containment, with extraction for product removal, and covers the points you need to follow to reduce exposure to an adequate level.

It covers daily and weekly routine tasks of operation and maintenance. It does not cover major maintenance tasks or decommissioning of used equipment.

It is important to follow all the points on the sheet, or use equally effective measures.

Plan what you will do in an emergency.

For environmental guidelines see MC0.

Chemical vapour deposition (CVD)

Control approach 3 Containment

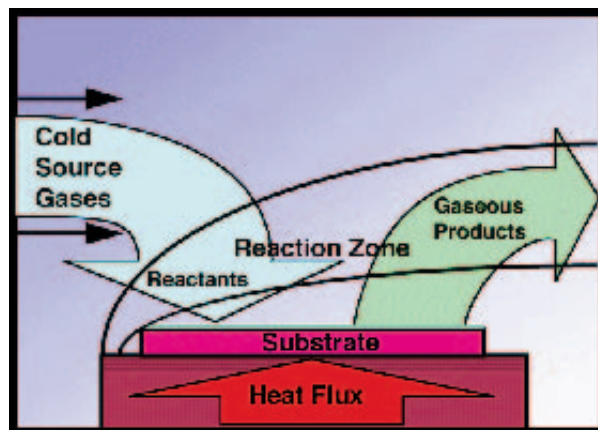
Access and premises

- ✓ Restrict access to authorised staff.
- ✓ Keep the exit routes clear.
- ✓ Label the work area, pipework and equipment clearly.

Equipment

- ✓ During general operation CVD units operate as a closed system.
- ✓ Follow the manufacturer's guidance for use.
- ✓ Make sure your controls for CVD equipment include:

- Continuous monitoring for toxic and very toxic substances at gas feeds and waste decontamination.
- Sequence and purge controls in the deposition chamber.
- Regular schedules for testing alarms and system controls.



Chemical Vapour Deposition (CVD) takes place within a closed system. Monitor gas feeds and waste outlets for toxic substances and always check the chamber is clear before opening.

- ✓ Can you use less hazardous products, or eliminate the process?
- ✓ Use benches and tanks manufactured from materials that are compatible with the chemicals being used (eg steel for solvents and fire retardant plastic for non-solvents).
- ✓ Provide a manometer or pressure gauge to check the extraction has cleared the enclosure before opening the chamber. Link this to a visual or audible warning alarm.
- ✓ Keep extraction ducts short and simple. Avoid long sections of flexible ductwork.
- ✓ Discharge cleaned, extracted air to a safe place outside, away from windows, doors and air inlets.

Maintenance, examination and testing of controls

- ✓ Wear the appropriate personal protective equipment (PPE)/respiratory protective equipment (RPE) unless your risk assessment shows it is not necessary.
- ✓ Maintain the equipment, as advised by the supplier, in efficient and effective working order.
- ✓ Look for signs of damage every time you use the equipment; repair immediately.
- ✓ Noisy or vibrating fans can indicate a problem.
- ✓ At least once a week, check that the extraction system is working properly and check any manometer systems or alarms. Record any adverse findings.
- ✓ You need to know the design performance to know if extraction is working properly. The supplier's literature must give this information.
- ✓ A competent ventilation engineer should examine the system and test its performance at least once every 14 months (see HSE publication HSG54). Keep records of all examinations and tests for at least five years.

Additional Guidance

- ✓ If skin problems appear consult an occupational health professional.
- ✓ You may need air monitoring to make sure the controls are adequate. See COSHH essentials sheet G409 - see 'Further information'.
- ✓ Always consider elimination, removal or substitution.
- ✓ Review your risk assessment on a regular basis and when any changes take place.
- ✓ For general information on training, PPE, cleaning, housekeeping and maintenance, please see sheet MC0.

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
- *Monitoring strategies for toxic substances* HSG173 (Second edition) HSE Books 2006 ISBN 978 0 7176 6188 6
- *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
- *Working safely with solvents: A guide to safe working practices* Leaflet INDG273 HSE Books 1998 (single copy free) www.hse.gov.uk/pubns/indg273.pdf
- *Hydrofluoric acid poisoning: Recommendations on first aid procedures* Leaflet INDG307 HSE Books 1999 (single copy free or priced packs of 25 ISBN 978 0 7176 1751 7) www.hse.gov.uk/pubns/indg307.pdf

- EH40/2005 Workplace exposure limits: Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations 2002 (as amended) Environmental Hygiene Guidance Note EH40 HSE Books 2005 ISBN 978 0 7176 2977 0
- Other useful COSHH essentials sheets, available on www.hse.gov.uk/pubns/guidance/index.htm:
 - G409 *Exposure measurement: Air sampling*
 - G300 *Containment*
- The COSHH essentials risk assessment on www.coshh-essentials.org.uk/
- *Environmental, Health, and Safety Guidelines for Semiconductor Manufacturing Equipment* SEMI S2-0706b Semiconductor Equipment and Materials International (SEMI). Available to download from <http://dom.semi.org/downloads.nsf/standards?openview> or go to http://wps2a.semi.org/wps/portal/_pagr/103/_pa.103/210 and select the 'search semi standards' link

Useful links

- HSE priced and free publications are available from HSE Books
Tel: 01787 881165 Website: www.hsebooks.co.uk.
- For information about health and safety ring HSE's Infoline Tel: 0845 345 0055 Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com.
- Contact the British Occupational Hygiene Society (BOHS) on 01332 298101 or at www.bohs.org for lists of qualified hygienists who can help you.
- Look in the Yellow Pages under 'Health and safety consultants' and 'Health authorities and services' for 'occupational health'.
- Also see www.nhsplus.nhs.uk.

Employee checklist

- Are the engineering controls and extraction systems working properly?
- Is the equipment in good condition and working properly?
- Make sure you know what to do if there is a leak or spill.
- Make sure you have the right PPE for the job you are doing, that it's in good condition and that you use and store it properly.
- Do not use gloves that are punctured, split, cracked or otherwise damaged.
- If you find a problem, tell your supervisor. Don't just carry on working.
- Don't smoke in the work area.
- Wash your hands before and after eating, drinking, smoking and using the lavatory.
- Check your skin regularly for dryness or soreness – tell your supervisor if these appear.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.