

MC5

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.

Photolithography exposes masked wafers to UV light, chemically etching the exposed material.

Chemicals used are flammable and irritant.

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.

Check the supplier's material safety data sheet - can you use safer chemicals?

Plan and practise what you will do in an emergency.

For environmental guidelines see MC0.

Photolithography processing

Control approach 3 Containment

Access and premises

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

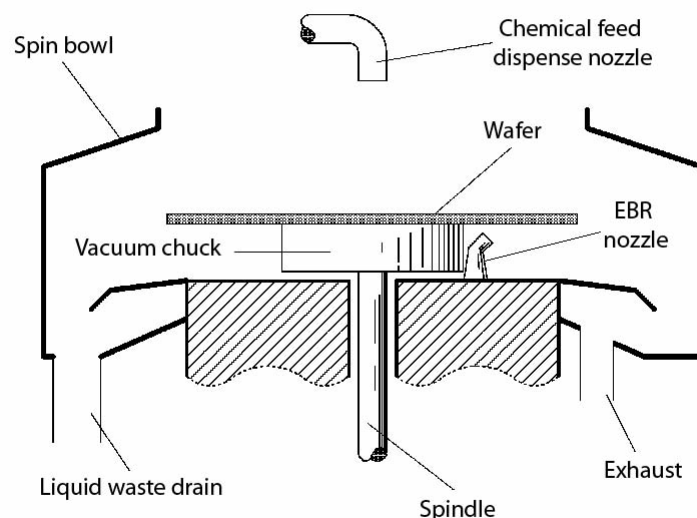
Equipment

- ✓ Contact suppliers of the specialised equipment for further information on the types of containment available, and advice on how to use it.
- ✓ Get all the details you need from the supplier to safely operate the system.
- ✓ Can you use less hazardous products, or eliminate the process?
- ✓ Can you use automated systems?
- ✓ Enclose chemical feed routes.
- ✓ Set the extraction as specified by the equipment manufacturer.
- ✓ Category 3 + and above lasers should be used for aligning the reticules in the process, and interlocking guards are therefore required.

Maintenance, examination and testing of controls

- ✓ Maintain the equipment, as advised by the supplier, in efficient and effective working order.
- ✓ Maintain the chemical delivery and dispense points to prevent spillage.
- ✓ Clean the equipment regularly to prevent photoresist residues accumulating inside the machine.

Enclose delivery routes to the chemical feed dispense nozzle, ensure waste liquids and cleaned, extracted air are discharged safely.



- ✓ You need to know the design performance to know if extraction is working properly. The supplier's literature should give this information. Otherwise, hire a competent ventilation engineer to determine its baseline performance and keep this information in your testing logbook.
- ✓ Look for signs of damage (eg door and window seals) every time you use the equipment; repair damage immediately.
- ✓ 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. Some systems may continuously monitor the performance of the extract system.

Training and supervision

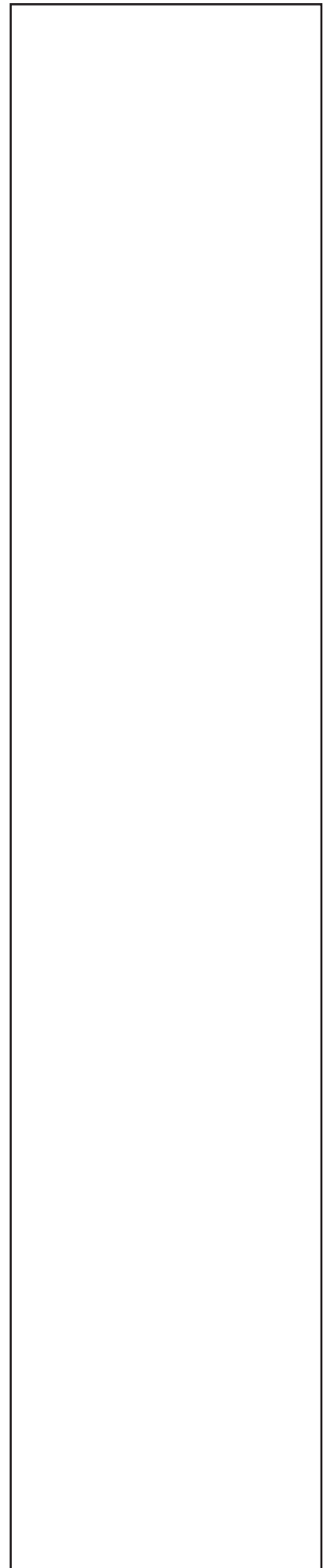
- ✓ Show workers this sheet and check that they understand it.
- ✓ Tell employees about the hazards of Photoresist. Ensure they read and understand the supplier's safety data sheet (Section 15) or the product label.
- ✓ Check that the procedures for service and maintenance are being followed.
- ✓ Check that the procedures for photolithography are being followed.
- ✓ Supervise contractors and visitors that may be in the vicinity.
- ✓ Check that workers follow the defined work method and don't endanger themselves by deviating from instructions.
- ✓ Include managers and supervisors in health and safety training.

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.
- ✓ Consider additional specialist support for health surveillance.
- ✓ Ensure that the assessor is competent. See Regulation 6 of the COSHH Regulations. See INDG136(rev3) - see 'Further information'.
- ✓ 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
- *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



- *General ventilation in the workplace: Guidance for employers* HSG202 HSE Books 2000 ISBN 978 0 7176 1793 7
- *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/
- *Code of Practice: Safety Features of Chemical Workstations Issue 1* Semiconductor Safety Association (Europe) on behalf of the Microelectronics Semiconductor Manufacturing Joint Working Group 1994 ISBN 978 1 872780 02 3 Web version available at www.plade.com/editorial/code.html
- *Environmental, Health, and Safety Guidelines for Semiconductor Manufacturing Equipment* SEMI S2-0706b and *Safety Guidelines for Heated Chemical Baths* SEMI S3-91 Semiconductor Equipment and Materials International (SEMI). Both 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.