MC1

COSHH essentials for the microelectronics industry

Wet etch processing

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.

This sheet applies to work involving wet etch processing. It covers daily and weekly routine tasks of operation and maintenance. It does not cover major maintenance tasks or decommissioning of used equipment.

Hazards include the use of corrosive mineral acids and flammable solvents. Exposure to corrosive materials can cause respiratory tract irritation. Exposure to solvents can cause narcosis.

This sheet describes good practice using containment where possible, or engineering control (local extraction or an extracted booth).

It covers the points you need to follow to reduce exposure to an adequate level.

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

Check the supplier's safety data sheet. Write down what you will do in an emergency.

For environmental guidelines see MC0.

Control approach 3 Containment or
Control approach 2 Engineering control

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

Equipment
✓ 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).
✓ In general, wet benches used within the microelectronics industry fall into three main categories:

  ■ Category 2 total enclosure;
  ■ partial enclosure; and
  ■ laminar flow.

✓ For extracted booths with no laminar flow, the airflow at the opening should be at least 0.5 metres per second.
✓ For extracted booths with vertical laminar flow, check the air-flow patterns within the bench by using 'smoke tubes' or tracer gas. Air-flow meters are not suitable.
✓ Fit a manometer or pressure gauge attached to the extraction duct to show that the equipment is working. Link this to a visual or audible warning alarm.
✓ Keep extraction ducts short with few bends. Avoid long sections of flexible ductwork.
✓ Use ductwork material that is compatible with the chemicals being used.
✓ Discharge cleaned, extracted air to a safe place away from windows, doors and air inlets.
✓ Provide good lighting suitable for the chemicals and tasks, eg flameproof for solvent benches.
✓ Dispose of used process chemicals via suitable drainage systems for solvents and non-solvents. Can you use dump valves or aspirators to avoid contact with the chemical?
✓ Don't store anything in the enclosure which could block the extraction. Don't store chemicals beneath the bench.

Maintenance, examination and testing of controls

✓ Maintain the equipment, as advised by the supplier, in efficient and effective working order.

✓ Visually check the equipment daily.

✓ 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. Record any adverse findings.

✓ You need to know the design performance to know if extraction is working properly. The supplier's literature should 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.

Cleaning and Housekeeping

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

✓ Put contaminated gloves and overalls and other personal protective equipment (PPE) in the correct bin for hazardous waste. This waste needs disposal by specialist waste companies.

✓ Ensure that incompatible wastes are not mixed.

✓ Ensure all containers have lids and are labelled.

Personal Protective Equipment (PPE)

✓ Workers need:

- eye protection;
- protective goggles;
- impervious aprons; and
- protective footwear.

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

✓ Skin creams help in washing contamination from the skin. After-work creams help to replace skin oils.

Additional Guidance

✓ If skin problems appear you should consult an Occupational Health Professional.

✓ You may decide to have air monitoring done to make sure the controls are adequate. See COSHH essentials sheet G409.

✓ For general information on training, PPE, cleaning, housekeeping and maintenance, please see sheet MC0.
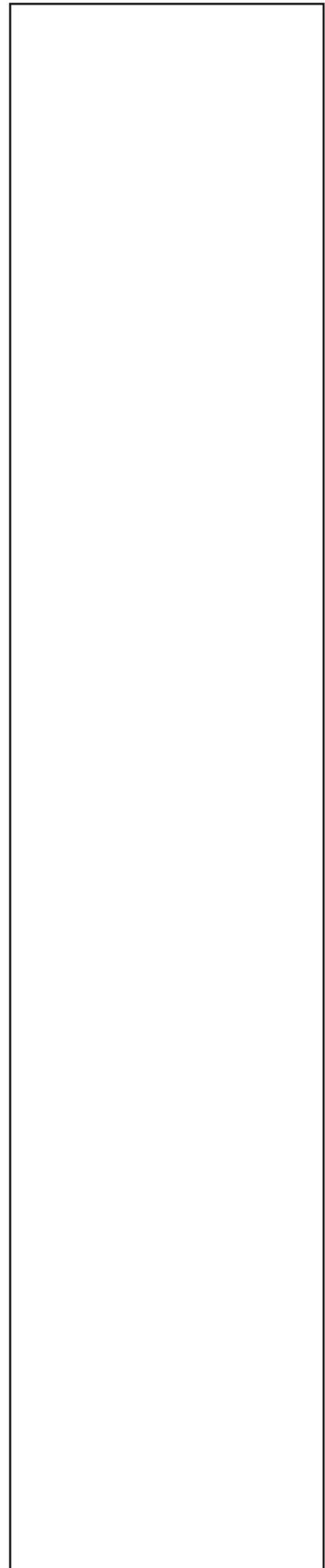
Further information

- *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
- *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
- *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

- For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.
- 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.

This document is available at: www.hse.gov.uk/pubns/guidance/ and www.hse.gov.uk/coshh/essentials/

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.