10 Thorough examination and test

Key points

- Every employer's LEV system requires statutory 'thorough examination and testing' by a competent person.
- The examination and testing report should have a prioritised list of any remedial actions for the employer.
- The employer's engineer and person responsible for health and safety both need to see the report.

323 This chapter describes the statutory examination and test required for LEV systems. It supplements guidance in COSHH Regulations ACOP and guidance.

Introduction

324 Routine checks (daily, weekly, and monthly) keep the LEV system running properly. The frequency of routine checks and their description should be set out in the system logbook. A trained employee is able to make routine checks. Employees should report any defects in LEV to their supervisor. The employer must ensure that those who check or examine LEV have adequate knowledge, training and expertise, ie they are competent.

325 The thorough examination and test can be used by an employer as an audit of the past year's LEV system management. The objective of testing is to detect significant defects and to have them remedied to maintain control.

326 The COSHH Regulations require thorough maintenance, examination and test of exposure control measures at intervals so that controls remain effective at all times. 'Controls' mean more than just the 'hardware' and include:

- engineering controls including LEV; and
- systems of work and supervision.

Thorough examination and test

327 A thorough examination and test is a detailed and systematic examination sufficient to ensure that the LEV can continue to perform as intended by design and will contribute to the adequate control of exposure. The thorough examination would normally include such functional testing to provide sufficient evidence to indicate adequate control is being achieved. The thorough examination and test may be carried out by a person who is competent and is able to make an objective assessment of the LEV. This can be:

- an outside contractor; or
- a competent employee of the LEV owner (the employer).

328 Information on the 'competence' of the LEV examiner appears in Chapter 2 and Appendix 1.

Frequency of thorough examination and test

329 The maximum time between tests of LEV systems is set down in COSHH and for most systems this is 14 months (see the exceptions in Table 18). In practice, this is normally taken to mean annually. If wear and tear on the LEV system is liable to mean that the system effectiveness will degrade between tests then thorough examinations and tests should be more frequent.

Table 18 Legal maximum intervals for thorough examination and test of LEV plant used in certain processes (COSHH Schedule 4)

Process	*Minimum frequency*
Processes in which blasting is carried out in or incidental to the cleaning of metal castings in connection with their manufacture	1 month
Jute cloth manufacture	1 month
Processes, other than wet processes, in which metal articles (other than gold, platinum or iridium) are ground, abraded or polished using mechanical power, in any room for more than 12 hours a week	6 months
Processes giving off dust or fume in which non-ferrous metal castings are produced	6 months

330 In practice, some of these intervals may be helpful in suggesting suitable reduced intervals for testing of similar processes, eg abrasive blasting of articles other than castings: 1 month.

331 Although not necessarily part of the thorough examination process, there should be regular reviews of systems of work and behavioural controls (including supervision).

Preparing to check, maintain, repair and examine LEV

332 The LEV examiner needs to know the risks from the system under test. These include:

- health risks from residues within the systems;
- safety risks from mechanical parts of the LEV, work at height, electricity, manual handling and moving vehicles.

333 The employer and examiner need to co-operate to ensure minimal risk for both service provider and employees (operators) who may be affected by the work. The employer should arrange for permits-to-work (where necessary) and safe access. The employer should also provide information about personal protective equipment requirements.

334 For statutory thorough examination and test, the examiner should, where available, use the following information sources:

- the LEV system commissioning report;
- the LEV user manual;
- the logbook for the system;
- the previous LEV system statutory report;
- confirmation that there have been no changes to the LEV, layout or process since the last test.

335 The examiner should verify that the documents apply to the system under test. If none of these documents is available, an adequate 'thorough examination and test' could take the status of a commissioning report. In such cases, the examiner's report would need to contain sufficient detail to produce information for a user manual. This additional service, and any costs, would need to be agreed between the client and the service provider.

Carrying out a thorough examination and test

336 The examination and test procedure and methods are similar to the original commissioning exercise, with similar qualitative and quantitative methods. Thorough examination and testing of LEV can be considered to comprise three stages:

Stage 1 A thorough visual examination to verify the LEV is in efficient working order, in good repair and in a clean condition.
Stage 2 Measuring and examining the technical performance to check conformity with commissioning or other sources of relevant information.
Stage 3 Assessment to check the control of worker exposure is adequate.

337 LEV examiners need the appropriate equipment such as Pitot tubes, a smoke generator, a dust lamp, an anemometer and, sometimes, equipment for air sampling.

Stage 1 Thorough visual and structural examination

338 This may include, as appropriate:

- thorough external examination of all parts of the system for damage, wear and tear;
- internal duct examinations;
- checks that any filter cleaning devices (eg shake-down, reverse or pulsed jet) work correctly;
- inspection of the filter fabric. Where filters have built-in pressure gauges, checks on their function (and that the operating pressure is correct);
- checks of the water flow and sump condition in a wet scrubber;
- checks that the monitors and alerts/alarms are functioning correctly;
- inspection of the air mover drive mechanism, eg fan belt;
- checks for indications of effectiveness. Are there significant deposits of settled dust in and around the LEV hood? Is any part of the system vibrating or noisy?

Stage 2 Measure technical performance

339 This may include, as appropriate:

- test points (eg indicated in the system documentation). This includes hood faces, branch ducts and the main duct;
- measuring static pressure at suitable test points indicated in the system documentation. This includes all hoods, ducting, across the air cleaner and fan;
- checking the fan speed, motor speed and electrical power consumption;
- check direction of rotation of the fan impeller;
- checking the replacement or make-up air supply;
- testing alarms, by simulating a failure, and the alarm's ability to detect the failure;
- measuring air temperatures;
- testing the air cleaner performance (eg a recirculating system).

340 Environmental legislation may require testing of air discharges but this is not covered by this book (see www.netregs.gov.uk).

341 The examiner should calculate volume flow rates. The next steps are:

- to compare the results of testing with the LEV design specification as reported in system documentation such as the user manual or other sources of performance standards;
- to diagnose the causes of discrepancies. With the employer's consent, the examiner may, where possible, make simple alterations that restore the required performance. An example is where displaced dampers cause a multi-branch system to be out-of-balance; the examiner may re-balance the system.

342 If the system is unsafe, the examination should stop until the system has been repaired and its original performance restored. The examiner should warn the client promptly.

Stage 3 Assess control effectiveness

343 This may include, as appropriate:

- careful observation of processes and sources;
- assessment of how effective the LEV is at controlling operators' exposure;
- challenge tests with smoke with the process running, to check for smoke leakage, eddying and breathing zone encroachment (when smoke testing, the examiner should warn employees and may need smoke alarms turned off);
- dust lamp tests with the process running to check for escape of dust or mist;
- observation of the way operators work, whether the LEV is providing adequate control and protecting the operators from any contaminants.

Marking hoods

344 The employer should ask the examiner to attach a test label to each hood when tested (see Figure 46), where appropriate. This is an effective way of providing information on whether or not an examination has been done or when it's due.

345 Supervisors and operators, as well as employers, also need to know when a hood (or LEV system) has failed. Attaching a 'fail' label is an effective way of easily providing this information.

Test record:

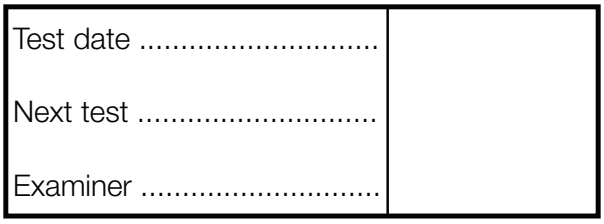

Figure 46 A test label for an LEV hood

Inadequate control:

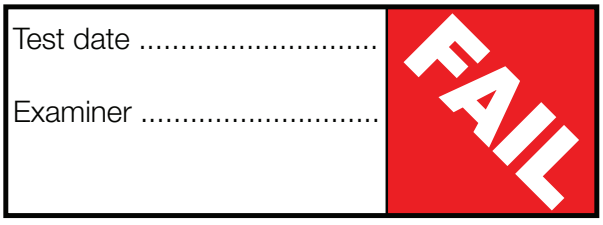

Figure 47 A fail label for an LEV hood

346 The criteria for a red label are:

- No airflow.
- Failure of an enclosing hood to contain the contaminant cloud.
- Failure of a receiving hood to intercept or contain the contaminant cloud.
- Failure of a capturing hood, eg the capture zone does not encompass the working zone.

347 It may be useful to use a red label for other parts of the LEV system that have clearly failed.

Report of LEV thorough examination and test

348 The HSE website (www.hse.gov.uk/lev) has an example form for recording this information. The examiner judges whether the system is contributing effectively to controlling exposure to substances hazardous to health and produces a prioritised plan for any actions. The employer should understand what actions are required, and if these are uncertain, contact an LEV supplier for expert help. Where maintenance or repairs are identified as priorities for action, the employer should plan and schedule such repair, and retest to assure control.

349 A comprehensive report will include:

- the name and address of the employer responsible for the LEV;
- the date of examination and test;
- the date of the last thorough examination and test;
- the identification and location of the LEV, and the process and hazardous substance concerned;
- the conditions at the time of the test and whether this was normal production or special conditions;
- a simple diagram of the LEV layout and location, with test points;
- the condition of the LEV system including hood serial numbers and, where appropriate, photographs of relevant parts;
- its intended operating performance for adequately controlling the hazardous substance and whether it is still achieving the same performance;
- the methods used to make a judgement of performance and what needs to be done to achieve that performance, eg visual, pressure measurements, airflow measurements, dust lamp, air sampling, tests to check the condition and effectiveness of the filter;
- the results of any air sampling relevant to LEV performance;
- comments on the way operators used the LEV;
- comments on system wear and tear and whether components may need repair or replacement before the next annual test;
- the name, job title and employer of the person carrying out the examination and test;
- the signature of the person carrying out the examination and test;
- the details of any minor adjustments or repairs carried out to make the LEV system effective. Note: The employer needs to know about critical defects immediately and should not wait for the report.

350 The employer should keep the examination and test report for at least five years. A copy should be available at the workplace containing the LEV system.

351 Where the LEV system was previously undocumented, the record should be a suitable basis for a system manual.

Some LEV measurement methods

352 A variety of qualitative and quantitative methods can be used to assess LEV. Some are described below. Follow the LEV manufacturer's instructions, where appropriate.

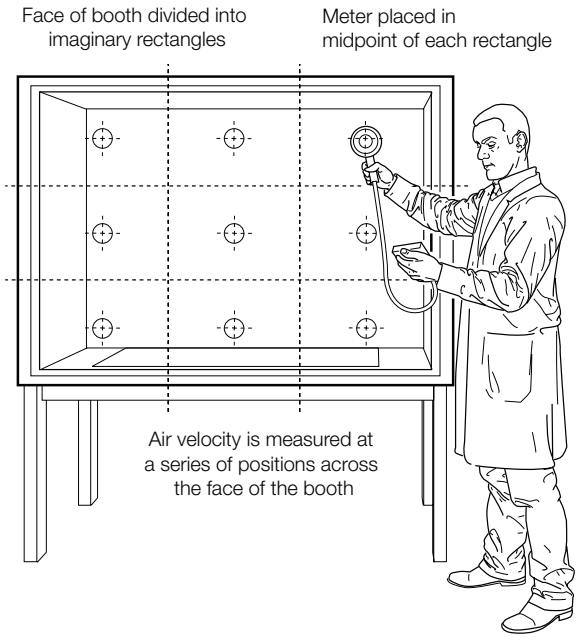

Figure 48 Testing large hood face velocities

Full enclosures

353 Measure the static pressure between the interior of the enclosure and the workroom. The pressure in the interior must be lower than the workroom.

Partial enclosures – Booths/fume cupboards

354 Measure the face velocity (see Figure 48). Readings should not vary excessively. Fume cupboards and microbiological safety cabinets should also be further tested according to appropriate BS or EN Standards.

Receiving hoods including canopies and capturing hoods

355 Measure the face velocity. For larger hoods, measure at several points over the face. Readings should not vary excessively.

Capturing hoods – Slots

356 Measure the air velocities at equidistant points along the entire length and average the readings. Readings should not vary excessively.

Hood static pressure

357 Measure the hood static pressure. If an airflow monitor is fitted, check the reading is correct.

Plenums

358 Measure the static pressure of the plenum (the enclosure behind certain types of hood) as well as the hood duct measurement.

Ducts

359 Measure the air velocity in the duct serving each hood, where this is possible. Measure in a straight section of duct – the measuring point should be well downstream of bends and other turbulence sources.

Fan/air mover

360 Measure the static pressure at the fan inlet and the volume flow rate. Measure the volume flow rate either on the fan inlet or outlet, wherever there is a reasonably straight section of duct – the measuring point should be well downstream of bends and other turbulence. For a belt-driven fan, measure the rate of revolution of the fan shaft with a tachometer. See manufacturer's instructions.

Filters

361 Measure the static pressure across the filter. Where a fabric filter has a shake-down cleaning device, operate the shake-down before taking measurements. If the air volume passing through the filter is the same as that through the fan, the filter flow rate need not be measured.

362 Check the functioning and accuracy of any fitted pressure gauges.

Special filter

363 Filtration of 'toxic' particles requires a high performance filter, for example high efficiency particle arrestors ('HEPA' or 'absolute' filters). Follow an appropriate British, European or ISO standard to test such filters *in situ*.

Wet scrubber

364 Measure the static pressure at the inlet and outlet, and the water pH if relevant to the scrubbing performance.