vent-tech
industrial environment control

METHODOLOGY FOR UNDERTAKING THOROUGH EXAMINATION AND TESTING (TExT) OF LOCAL EXHAUST VENTILATION (LEV) SYSTEMS

STANDARD OPERATING PROCEDURE

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1 PRINCIPLES OF THE METHOD

The purpose of the test is to ensure that Local Exhaust Ventilation systems used to remove substances hazardous to health are performing in a satisfactory manner and that any such system is adequately controlling operative inhalable exposure.

All controls are maintained in…

- **Efficient state**
- **Efficient working order**
- **Good repair**
- **Clean condition**

The objective of the assessment is to…

"ensure that all control measures perform as **originally intended**

and

continue to **prevent or adequately control exposure"**

2 RESPONSIBILITY

It is the responsibility of Vent-Tech Ltd to ensure that staff who undertake the examinations and tests are competent to carry out the steps set out in this procedure.

It is the responsibility of all staff undertaking the testing to ensure that they comply with the requirements of the procedure.

3 RESOURCES

3.1 Equipment

Persons undertaking this work will be issued with the following basic equipment and consumables required to undertake the work. A list of the equipment which can be used is given below:

Item	Description
Rotating vane anemometer	Measuring face velocity at large openings e.g., partial enclosures.
Hotwire anemometer	Measuring face velocity at small openings e.g., slots & small hoods.
Manometer	For measuring pressure readings. Often used in conjunction with a pitot tube.
Pitot tube	For measuring pressure readings in ducts. Used in conjunction with a manometer.

Dust lamp	For undertaking qualitative assessments of dust application processes.
Smoke generating device	For undertaking qualitative assessments of air flow & identifying enclosure clearance times.
Battery drill with 10mm drill bit	For drilling test holes in ducting.
Step ladder	Aluminium 8-rung ladder.

3.2 Calibration

All equipment will be calibrated annually in line with the manufacturer's recommendations.

Vent-Tech ISO system will be used to track calibrations.

3.3 Consumables

- Test labels
- Hole sealing grommets
- Personal Protective Equipment including:
  - Safety boots
  - Coveralls
  - Gloves
  - Respirator
  - Safety glasses
  - Bump cap & hard hat
  - High viz vest

Specialist PPE may be required subject to Risk Assessment of specific system.

4 ESTABLISHED STANDARDS

Control of Substances Hazardous to Health Regulation 9.

Control of Substances Hazardous to Approved Code of Practice L5 (sixth edition) 2013.

Health and Safety Executive publication HSG258 (third edition) 2017 'Controlling airborne contaminants at work A guide to local exhaust ventilation (LEV).

Health and Safety Executive publication L138 (second edition) Dangerous substances and explosive atmospheres.

HSG 263 Isocyanate paint spraying Safely managing spray booths and rooms.

5 HEALTH, SAFETY AND ENVIRONMENT

5.1 Risk Assessment

Specific risk assessments are to be performed for work which is covered by this procedure.

Where the work falls outside of the scope of this risk assessment a further assessment must be performed before work commences. This risk assessment must be in a written form.

5.2 Waste Disposal

Target	Precautions
Old labels	Waste labels and backing sheets should be disposed of as general waste.
Used batteries	Used batteries must be recycled.

6 PROCEDURE

6.1 Scheduling

A list of systems for the site will be maintained by Vent-Tech. The list will indicate the nature of each system and the frequency with which it is to be tested. A schedule will be drawn up for testing ventilation systems each month and provided to interested parties prior to testing commencing.

6.2 Planning

The assessor will liaise with necessary persons to arrange access to the systems at times where it can be tested, and the conditions of use can be observed.

The assessor must contact the owner of the LEV system in advance via email identifying the systems to be tested and any other necessary requirements to enable the testing to be undertaken prior to the test being undertaken. If the client cannot operate the system before the due date of the test, it should be tested 'as is' and appropriate comments/actions made in the report indicating that the system could not be observed in normal operation and that the report should state this (i.e., no processing taking place at the time of assessment).

6.3 Examination and Testing

Examination and testing will be conducted in line with the requirements of Chapter 10 of HSG258. The examination and test will consist of the three stages described within HSG258:

Stage 1 A thorough visual and structural examination to verify the LEV is in:

- efficient working order,
- in good repair and
- in a clean condition.

Stage 2 Review of the technical performance to check conformity with commissioning or other sources of relevant information.

Stage 3 Assessment of control effectiveness.

6.3.1 Measurements

Measurements will be conducted in line with the guidance in HSG258. The specific measurements required for each system will vary but should generally include several of the following.

- Face velocity at hoods
- Hood area
- Capture distance for capturing type hoods
- Duct diameters
- Duct pressures (both velocity pressure and static pressure)
- Pressure drop across fan
- Pressure drops across filters

6.4 Recirculating air

Where LEV systems recirculate filtered air then the examination and test will include an indicative assessment of the performance of the filter.

6.4.1 Particulate systems

In the case of systems filtering particulates then a direct reading dust meter will be used. The meter shall be set to measure '**Inhalable Dust**' over an average period of 1 minute. Measurements will be made at the centre line of the exhaust to the LEV system within 10 cm of the exit.

This test is then to be repeated with the meter shall be set to measure '**Respirable Dust**' over an average period of 1 minute. Measurements will be made at the centre line of the exhaust to the LEV system within 10 cm of the exit.

If this is not possible then an alternative measurement is to be recorded and the position of the measurement is to be noted and photographed for future reference.

Measurements will be made of:

- The background levels when the system is not running.
- The levels when the system is running but the associated process is not.
- The levels when the system is running with the associated process also running.

The results will be compared to determine whether the system gives a significant difference between them.

Dust levels when the process is running should be less than 1.0 $mg.m^{-3}$ or 1/10th of WEL, (whichever is lower) and not significantly different from the background levels. Results outside these criteria will be noted within the report for further investigation by the client.

For substances that require control to 'As Low As Reasonably Practicable' (ALARP) any measure of dust passing through the filter will constitute a failure of the system as it shall be deemed by default to not be providing adequate control.

NOTE: THESE READINGS ARE INDICATIVE OF DUST LEVELS IN THE AIR BEING DISCHARGED FROM THE FILTER PLANT. THEY DO NOT CONSTITUTE PERSONAL AIR MONITORING AND SHOULD NOT BE USED TO ASSESS OPERATOR EXPOSURES OR COMPARED TO WORKPLACE EXPOSURE LEVELS

In the case of soldering extraction systems, the filters will be assessed by using a smoke tube at one of the extraction points.

6.4.2 Organic vapour systems

In the case of systems filtering organic vapours then a direct reading PID will be used.

The meter will be set to measure Volatile Organic Compounds as Isobutylene over an average period of 1 minute. No other correction factors will be applied.

Measurements will be made at the centre line of the exhaust to the LEV system within 10 cm of the exit.

If this is not possible then an alternative measurement is to be recorded and the position of the measurement is to be noted and photographed for future reference.

Measurements will be made of:

- The background levels when the system is not running.
- The levels when the system is running but the associated process is not.
- The levels when the system is running with the associated process also running.

The results will be compared to determine whether the system gives a significant difference between them.

It is normal for some breakthrough of organic vapour filters to occur and to find some organic vapour being emitted. The amount of vapour which is allowable will depend upon the area and substance where it is released. However, in general terms breakthrough from systems should not exceed 1/10th of the WEL for the substance being controlled'.

6.4.3 Drilling of holes

Where it is necessary to drill holes in ductwork (to enable measurements to be taken) the assessor will liaise with the client.

Test holes will be drilled considering the risk of fire or explosion which may result from heat or sparks generated during the drilling process.

After measurements have been made any holes will be sealed with grommets.

6.5 Checks

Frequent checks shall be made to ensure inaccuracies do not occur due to the following:

- The holes of the Pitot tube become blocked. This is often indicated by erratic values. This can be rectified by removing tubing and blowing on the clean end of the tube to remove debris or by 'rodding' the tube with a piece of wire.
- The tubing connecting the Pitot tube to the manometer has split. This is indicated by erratic values. In this case the tubing is to be trimmed to remove the offending element or replaced.

An annual review will be undertaken by the auditor of the Institute of Local Exhaust Ventilation Engineers (ILEVE) as part of the ILEVE Partner Scheme, to check compliance of reports and procedures and assessment of personnel undertaking the LEV inspection and test.

6.6 Identifying Enclosure Clearance Times

Prior to undertaking such tests, the inspecting engineer shall liaise with the client to ensure that any necessary fire alarms are isolated, or other control measures that are required are in place.

The following steps should be carried out:

6.6.1 Items in the enclosure/room/booth

The spray booth / room or enclosure should be empty when measuring the clearance time. This is because the volume of a part, component or aircraft will effectively reduce the volume of a booth or enclosure and give a lower clearance time. In addition, the smoke generated is made of a glycol aerosol and may leave a greasy deposit on any vehicle or body part in the booth/enclosure.

6.6.2 Operation at time of test

The spray booth / room or enclosure should be set up for normal operations except with the ventilation deactivated (see No. 3) and the lights on maximum to enable the smoke aerosol to be seen.

6.6.3 Extraction system

Ensure that the extraction system is turned off.

There are two reasons for this:

- In a spray booth / room or enclosure with the ventilation running it would be very difficult to fill the enclosure completely.
- Filling the spray booth / room or enclosure with the extraction turned off will give a clearance time showing the worst-case scenario ensuring the room is clear before anybody enters the enclosure, or sprayers remove their RPE.

6.6.4 Filling with smoke

Fill the spray booth / room or enclosure with smoke, making sure to distribute smoke evenly throughout the spray booth / room or enclosure (an extension lead may be useful in allowing all areas of the room to be reached).

The spray booth / room or enclosure shall be regarded as full when the facing wall is no longer visible when viewed across the short axis of the room. Depending on the fog machine used, it may cut out and require time to reheat one or more times before this is achieved.

6.6.5 Conducting the test

Switch on the ventilation system and start a timer simultaneously.

6.6.6 During the test

During the smoke test the opportunity should be taken to do a visual inspection of the exterior of the spray booth / room or enclosure and any associated ductwork to check for any leaking air.

6.6.7 Completing the test

The spray booth / room or enclosure shall be regarded as clear when smoke is no longer visible in any part of the enclosure. A dust lamp (viewed from a narrow angle towards the beam of light) may be useful in judging this, though ensuring that the enclosure is truly full at the start of the measurement is more important than precise judgement of when the smoke has cleared. The difference between clear by eye and clear using a lamp is typically 30 seconds longer.

Note:

The time at which the enclosure is judged to be clear of smoke. This time should be rounded up to the next quarter minute.

This should be put on a notice and displayed on the door or entrance of the booth, room or enclosure, and all personnel who need to know should be told.

6.6.8 Clearance Zones

The assessor must record the times that the smoke takes to clear from:

- The operators Breathing Zone (a 300mm sphere centring around the operators nose and mouth) when they enter the enclosure,
- The Working Zone (i.e., the area where the work is carried out) and,
- The entire enclosure.

6.6.9 Further reading

For further information on clearance time please visit:

Spray booth

Myths

7 FAULTS

Faults, breakdowns, and failures will be noted, and appropriate corrective actions included within the report.

The level of fault with the system would determine the course of action as described in the table below.

Category 1 – Equipment fails to protect end user or is dangerous	The equipment should be shut down and isolated and the system owner should be informed verbally followed up by email.
Category 2 – Equipment has faults, but they don't significantly affect performance	The equipment may remain in operation, but the report should describe the corrective actions which need to be put in place.
Category 3 – Observations for improvements	Corrective actions should be included within the report. Where the actions occur on multiple systems and show a systemic failure then verbal communications should be started with the client.

8 REPORTING

Normal reporting lines will consist of a written report which will be produced for each LEV System.

Under normal circumstances the report will be sent to the client within two weeks of the testing taking place. Uploading of failure reports etc. as outlined in section 8.1.

The report shall be compiled using the appropriate template (based on ILEVE template). The template allows for a flexible approach in reporting so that only those parameters required for individual systems need be reported.

A schematic diagram shall be drawn of the LEV system. The schematic diagram shall show the location of all test points.

Where possible the report will include photographs showing the system and in particular any areas of concern.

8.1 Reporting failures or areas of concern

Where faults or concerns are found or observed with the LEV systems and/or its usage, these shall be documented within the report together with comments and recommended actions.

When a fault is such that it is likely to give rise to a significant increase in exposure to hazardous substances then an immediate verbal report shall be made to the owner (building manager, supervisor, or other senior person) of the system. This will be backed up by email, followed by the formal report.

Repeated systematic faults which are found with more than one system shall be flagged within reports with corrective actions being proposed. In addition to this a separate communication shall take place with Leonardo Helicopters to discuss preventative actions. In the first instance this shall be a verbal or email communication with the relevant department.

9 RECORDS AND ASSOCIATED DOCUMENTS

LEV TExT Report Template

Risk Assessment for routine TExT

Method Statement for routine TExT