



Dust control in dyestuff handling

Dyeing and Finishing Information Sheet No 6

Introduction

Dust from dyestuffs used in textile finishing can be harmful to health. This information sheet gives advice on controlling dust from the handling of dyestuffs. It should be read in conjunction with Dyeing and Finishing Information Sheets 1-5:

- No.1 Dyes and chemicals in textile finishing: An introduction.
- No.2 Non-dyestuff chemicals: Safe handling in textile finishing.
- No.3 Dyestuffs: Safe handling in textile finishing.
- No.4 Hazards from dyes and chemicals in textile finishing: a brief guide for employees.
- No.5 Reactive dyes: Safe handling in textile finishing.

General approach

Information sheet no.3 describes the processes which may give rise to dust from dyestuffs. Basically the more vigorous the process, the more dust will arise. Exposure may also arise from poor storage, damaged containers, spillage, and from dust which has previously settled in the workplace.

Employees must do a risk assessment as required by the Control of Substances Hazardous to Health Regulations 1999 (COSHH)¹ to look at ways that exposure may arise. The steps involved in doing a risk assessment will include reference to the supplier's safety data sheets, observing work being done, talking to employees and supervisors as well as considering results from any monitoring for dust levels.

The assessment will reveal those areas where control needs to be improved. The approach taken to achieving adequate control of dye dust should firstly be to stop dust being generated altogether, secondly to design or alter processes and work practices to reduce the amount of dust, and finally to control any remaining dust which is generated.

Controlling risk from dyestuff dust

The starting point should be to stop dust being generated altogether. Whenever possible you should handle dyes in dust-free or reduced-dust forms, for example, in solution, as granules, pellets, pastes, or de-dusted powders, rather than as dry powders. Contact your suppliers for advice.

Where you cannot avoid handling of dyes in their dry powder form, you should reduce the amount of handling to a minimum. It may be possible to eliminate some stages in a process, for example, by:

- buying pre-weighed quantities;
- weighing dyes directly from the original containers rather than from storage bins;
- dissolving dyes under local exhaust ventilation (LEV) immediately after weighing;
- weighing into process-compatible, water-soluble bags.

Another important factor is the working practices of the operator. Careful working can considerably reduce the amount of dust released, so provide training in good handling practices.

Local exhaust ventilation (LEV) - dispensing and weighing

The COSHH assessment for handling dry powder dyestuffs will usually indicate that engineering controls, including LEV are required. In particular a high level of control will be required when handling reactive dyes. (If further help is required in selecting the appropriate level of control, the publication, *COSHH Essentials*² provides a step-by-step process for identifying the right controls to reduce exposure for many hazardous substances.)

The design of the LEV system will depend on how the dye is transferred from the container, how it is weighed out and the quantities to be weighed. However, it is important to keep all sources of dust release within a LEV enclosure, and dust should be effectively captured. The extraction should always pull the air away from the operator so the enclosure should be carefully designed to avoid the operator standing between the extraction and the weighing activity. Extraction systems which do not have an enclosure are unlikely to be effective.

Further information on the principles of LEV is available in HSE booklet HSG37, *An introduction to local exhaust ventilation*.³

Two different types of LEV may be used. In the simpler type, air is drawn through the enclosure from the workroom, dust is removed and the air is expelled to a safe area (horizontal laminar flow). In the second type (recirculated downflow), air is drawn through the enclosure as before, but after the dust has been removed, some of the air is recirculated and blown down

over the weighing enclosure. This system gives some protection from contamination and reduces the effect of air disturbance on delicate weighing machines where accurate weighing is essential.

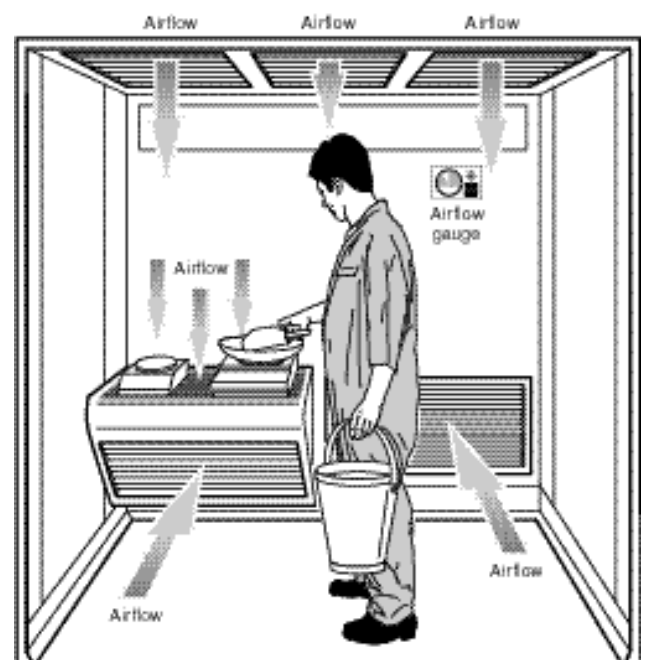
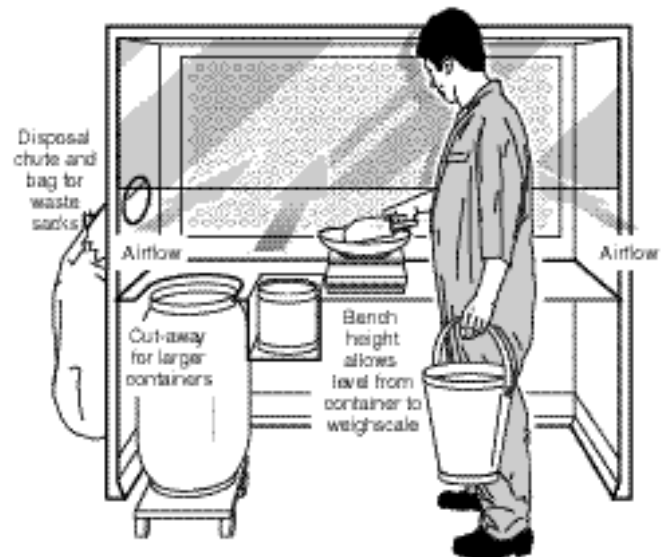
LEV enclosures may enclose just the work or, for larger weighing operations, may be a walk-in booth which the worker enters. Both types have the following design features:

- the work is enclosed on three sides and at the top and bottom;
- extraction is from the rear and through perforated baffles or grilles rather than through single slots or fishtails, in order to balance the airflow;
- air flow across the enclosure opening is 0.5 to 1 metre/second;
- construction materials are smooth, sound and with rounded corners for easy cleaning;
- good lighting which may be mounted externally on a clear panel for easy cleaning and to reduce fire risk;
- enough space for containers and all the work;
- balance readout is at the worker's eye level, separate from the balance if necessary;
- work is arranged to minimise exposures, for example, dyes are moved over minimum distances (horizontally and vertically) and workers do not need to lean into containers;
- a clearly visible gauge to indicate the airflow is working properly.

For bench top weighing, where a booth is fitted over the top of the bench, there may be a need to design the bench with a cut-away to accommodate larger containers. The front opening should be the smallest that safe and efficient working will allow and may be reduced by using a clear viewing panel or curtain at the top. Empty bags can be rolled up from the bottom, fastened with an elastic band and put into a waste sack via a disposal chute accessed from a side port inside the booth.

Bench top weighing stations may be fixed, where the storage containers are brought to the enclosure, or movable, where the scales, complete with LEV, are taken to each storage bin in turn.

In walk-in booths it is best if the workers can stand sideways on to the airflow for most of the tasks. Tasks must not require workers to stand between the work and the rear of the booth. Airflow at the position of the work should be 0.5 to 1 metre/ second and the extraction point should be positioned to achieve this. You may still need respiratory protective equipment as well as a walk-in booth when there is a residual risk of breathing in airborne dust.



Local exhaust ventilation – other processes

Avoid adding dry dyestuffs into mixing vessels, these dyes should normally be added in slurry form or in soluble bags. However, where LEV is required to control dust or aerosol which cannot be eliminated, it should be tailored to the individual circumstances. Where there is a risk of dust being given off from vessels, they should be closed to prevent dust escaping. Ports used for adding powders should be designed as follows:

- the port should be in a full enclosure with air extracted from the rear of the enclosure;
- the port should have a self closing, inward opening, flap;
- the enclosure should be at the right height and be big enough for the worker to open containers and dispense dyes within it;
- the enclosure should have a disposal chute for empty bags if necessary. (See benchtop illustration)

Operation of local exhaust ventilation

After the dust has been removed, extracted air should be released to a safe area. It may be returned to the workroom if certain precautions are taken. If reactive dyes, or other high hazard substances, are used then one, and preferably two, high efficiency filters (99.997%, BS 3928) should be used as well as an automatic warning of filter clogging or perforation. For other dyes, filter efficiencies of 97.5% are usually adequate. Put procedures in place for the safe removal of filters and for other maintenance work.

Check LEV approximately weekly to ensure it remains effective. This may be done using a vane anemometer at the enclosure opening or workstation within a booth, or by measuring the static pressure in the trunking from the booth. LEV should also be thoroughly inspected and tested at least every 14 months.

Housekeeping

Use robust containers with a closable lid for storage. However, remember that repeated removal and replacement of container lids and opening and closing of bags can also generate more dust. Plan to dispose of containers safely. Bags especially can cause problems and are best placed into disposal sacks at the workstation, under LEV. Also plan how you will deal with damaged containers and how to dispose of unwanted dyes.

Ensure that all areas where dyes are handled are easily cleanable with walls and floors which are sound and smooth. Rounded corners are easier to clean. Shelving and workbenches should be easy to clean or covered with impervious, disposable covering. They should preferably have a lip to retain spills.

Establish procedures for cleaning and for dealing with spillages. Dry vacuum cleaning, using a piped system or a type H industrial vacuum cleaner, is the preferred method for larger dry spillages and most cleaning tasks. Wet vacuuming or other wet cleaning methods may be appropriate in some situations or for smaller spillages. Avoid the use of brushes and compressed air.

Personal protective equipment (PPE)

PPE should only be used to protect workers as a last resort and in addition to other controls where it is not reasonably practicable to fully control the dust by other means. Care needs to be taken in the selection of PPE appropriate to the work and procedures should be put in place to ensure it is used properly and is maintained in good condition.

Coveralls of close-weave fabric (or suitable disposable ones) should be worn when handling dyestuffs.

Gloves and aprons may be required for certain tasks. They should be impermeable, and either disposable or cleanable. They should be removed when not needed because they may be a continuing source of dust if contaminated. Workers should remove gloves and aprons in a way that does not contaminate skin or clothes.

Respiratory protective equipment (RPE) may be needed for some tasks of short duration, such as filter changing. RPE should be carefully selected to provide adequate protection. It needs to be suitable for the wearer as well as for the task. Correct fitting is important and suppliers can help by offering face-fit testing. Beards and stubble growth prevent a good fit and facemask type respirators cannot be used in these circumstances. Where suitable for the wearer, disposable respirators giving protection against fine particulates (EN 149) to at least 10 times the occupational exposure limit will be adequate in most circumstances, but should be selected following an assessment.

References

- 1 *General COSHH ACOP (Control of substances hazardous to health) and Carcinogens ACOP (Control of carcinogenic substances) and Biological agents ACOP (Control of biological agents). Control of Substances Hazardous to Health Regulations 1999. Approved Codes of Practice L5 (Third edition) HSE Books 1999 ISBN 0 7176 1670 3*
- 2 *COSHH essentials – easy steps to control chemicals* HSG193 HSE Books 1999 ISBN 0 7176 2421 8
- 3 *An introduction to local exhaust ventilation* HSG37 HSE Books 1993 ISBN 0 7176 1001 2

The future availability and accuracy of the references listed in this publication cannot be guaranteed.

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops.)

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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