Selection and safe use of spotting solvents in textile and clothing industries

Textiles Information Sheet No 7

Introduction

This information sheet provides practical, step-by-step guidance on selecting spotting solvents and on how to prevent risks to the health and safety of people who use them.

Spotting solvents are used in textile and clothing manufacture to remove stains from fabrics. These can be caused by such things as loom and machine oils, felt-pens, coffee, grease and finger marks. Spotting solvents are usually applied to the fabric by spray gun but a cloth soaked in solvent may also be used. Typically, the fabric is left to dry by natural evaporation, but a compressed air jet can sometimes be used to assist drying.

Two main groups of spotting solvents are used – halogentated hydrocarbons and olefins. Halogentated hydrocarbons include trichloroethylene,* 1,1,1 trichloroethane, bromochloromethane and dichloromethane. Olefins include aliphatic hydrocarbon solvent blends and isoparafinic hydrocarbon blends. 1,1,1 trichloroethane is to be phased out due its harmful effect on the ozone layer.

Exposure and health effects

People are exposed to spotting solvents by inhaling mist and vapour and by solvent being absorbed through the skin. Solvents can also enter the body through handling food and drink and by smoking.

The main effects are irritation of the skin, eyes and lungs, headache, nausea, dizziness and light-headedness. Repeated or prolonged skin contact can cause dermatitis. Solvents can also impair co-ordination and this can lead to accidents. Other effects on health vary according to the solvent being used.

What the law requires

The COSHH[1] regulations require employers to assess risks to health and to prevent exposure, or where this is not reasonably practicable, to adequately control the risks. The main aim of these regulations is to eliminate or reduce risk to health by selecting the least harmful products for the job.

*Trichloroethylene has been reclassified as a category 2 carcinogen with effect in the UK from Spring 2002. The specific requirements of COSHH on carcinogens and the carcinogens ACoP will apply to its use in the workplace.

Under CHIP[2] manufacturers and suppliers have a legal duty to supply users with information about the hazards and health risks of their products in Material Safety Data Sheets (MSDSs).

Solvents with a flash point below 32 °C may also be subject to the Highly Flammable Liquids Regulations[3] which deal with how the solvents are stored and used and the amount that can be kept in the workroom.

Steps to selecting a solvent

The steps below will guide you through the decision-making process for selecting a solvent. You will need to refer to the MSDSs supplied with the solvents – the information you need is contained in the risk phrases (also known as R-phrases).

Step 1: Eliminate or reduce use

Whenever reasonably practicable, solvents should not be used. If you must use a spotting solvent, think about how its use can be minimised.

- Look at how stains occur. Could a change in production methods help to prevent or minimise staining? Experience has shown that a quality improvement programme can markedly reduce the need for spot cleaning.
- Could solvent-free agents, such as household type water-based cleaning products be used, even if just for some stains? (Some water-based agents also have health risks - these need to be assessed and balanced against the risks from spotting solvents. Steps 3 and 4 can help you to do this.)

Step 2: Consider the solvent's flammability

Avoid highly flammable solvents with risk phrase 'R11, flash point 21 °C or less'; the vapour from these can readily create a flammable atmosphere.
Solvents labelled 'R10, flammable (flash point above 21 °C but less than 55 °C) pose a lower risk. The higher the flash point, the lower the flammability risk.
Solvents with flash points above 55 °C should be used wherever possible. Although the risk of fire and explosion is much reduced they can still generate flammable atmospheres, for example, if dispersed as a fine mist at higher temperatures. The guidance in *The storage of flammable liquids in containers* HSG51 should therefore be followed as best practice.[4]

Step 3: Health risks

Hazard	Group	Risk phrase
Least hazardous	A	R36; R36/38; R38; other R-phrases not in groups B-E.
	B	R20; R20/21; R20/21/22; R20/22; R21; R21/22 or R22
	C	R23; R23/24; R23/24/25; R23/25; R24; R24/25; R25; R34; R35; R36/37; R36/37/38; R37; R37/38; R41; R43; R48/20; R48/20/21; R48/20/21/22; R48/20/22; R48/21; R48/21/22; or R48/22.
	D	R26; R26/27; R26/27/28; R26/28; R27; R27/28; R28; Carcinogen Category 3 R40; R48/23; R48/23/24; R48/23/24/25; R48/23/25; R48/24; R48/24/25; R48/25; R60; R61; R62; or R63
Most hazardous	E	Mutagen Category 3 R40; R42; R42/43; R45; R46; or Carcinogen Category 2 R49

Check the MSDS to find the health-related risk phrase(s) for the product and then look for that exact risk phrase (or group of phrases) in the list below. Group A is the least hazardous and group E the most.

Choose a solvent from the lowest possible hazard category in the list above. Avoid the use of substances in group E because they may cause serious and irreversible ill-health effects such as asthma, dermatitis and cancer.

Step 4: Check whether the solvent has an Occupational Exposure Limit (OEL)

Look in HSE's document *EH40/2002 Occupational Exposure Limits 2002* to see if the solvent has an OEL.[5] There are two types of OEL – Maximum Exposure Limits (MELs) and Occupational Exposure Standards (OESs).

Exposure to a substance with a MEL must be reduced as far below the MEL as is reasonably practicable. Exposure to a substance with an OES should be reduced at least to the OES. (A spotting solvent with an OES would only need additional controls to reduce exposure if the OES was exceeded.) A solvent with a MEL may need additional controls even if exposure is below the MEL. This is mainly because MELs are often allocated to cancer and asthma causing agents and other substances for which no safe level of exposure for human health can be identified.

A solvent with a MEL may be replaced with one having an OES provided adequate control of exposure can be achieved.

Note: A Solvent without an OEL
If a solvent has neither an MEL or an OES it does NOT mean that the solvent is safe. For these substances you will need to determine your own in-house standards and working practices using information from manufacturers and suppliers, from publications, industry associations, etc.

Note: A Solvent for which an OES has been withdrawn
From time to time HSE publishes a 'Chemical Hazard Alert Notice' withdrawing an OES for a substance. If you use such a substance you will need to reassess its use. If a MEL has been assigned instead then follow the guidance given above in Step 3. If a MEL has not been recommended then follow the guidance in the notice.

Controlling exposure

Exposure to spotting solvents can be adequately controlled using the following control measures.

Store and dispense safely

Store solvents in properly labelled, suitable containers. Keep them securely closed and in a dry place away from sources of heat and ignition. The storage area should have adequate ventilation. *The storage of flammable liquids in containers* HSG51 provides further guidance on storing flammable liquids.[4]

Use safety containers as described in HSE's publication *Safe use and handling of flammable liquids* HSG140 to keep evaporation to a minimum and avoid spillage.[6] Keep the lids on and when dispensing solvents ensure that there is adequate ventilation and that skin and eyes are protected with suitable gloves and goggles.

Avoid spraying

Spraying generates mist as well as vapour and this can lead to high exposures particularly in poorly ventilated areas. Mists can also give rise to a flammable atmosphere even when the temperature is below the flash point. Use a suitable pad or brush if possible, which will also reduce solvent use.

Provide adequate ventilation

Areas in which spotting solvents are used should be well ventilated with high and low ventilation points. Opening doors and windows will increase ventilation but may not lower the exposures of people working directly with solvents. Spraying of fabric should be done under effective local exhaust ventilation (LEV) if exposures are above the OEL. The ventilation system should be regularly checked; a guide to checks and maintenance requirements is given in *Maintenance, examination and*

testing of local exhaust ventilation HSG54.[7] If solvent vapours are controlled below occupational exposure limits there will not be a flammability risk in the workroom.

Minimise skin contact

The potential for absorption of solvent through skin is high in spotting. Prevent direct skin contact by using a brush instead of cloths. If hand contact is unavoidable workers should wear gloves that protect against the specific solvent. Gloves that are suitable for one type of solvent may not be suitable for another. Consult your supplier of gloves to discuss your exact requirements. Refer to *Selecting protective gloves for work with chemicals: Guidance for employers and health and safety specialists* INDG330.[8]

Cloths used for rubbing fabrics should not be kept in pockets as this will lead to more skin contact. Cloths should be disposed of in closed containers.

Provide personal protective equipment (PPE)

Workers should wear overalls to prevent contamination of personal clothing. Where there is a risk of splashing, impervious aprons, gloves and goggles or visors should be worn. All PPE should be removed when taking breaks. The PPE provided should be kept clean, maintained and stored safely.

Note: PPE should only be used as a last resort means of control or to complement other measures.

Ensure adequate personal hygiene

Workers should wash their hands before eating, drinking and smoking and before going to the toilet. Eating, drinking and smoking should be prohibited in areas where solvents are used. Smoking causes fire risks and, in addition, solvents passing through a cigarette can break down into even more harmful substances. Solvents should not be used to clean skin.

Provide training for workers

Workers should be given information and training to make them aware of the health effects from working with solvents and how to recognise the symptoms of exposure. This may be based on the information provided in this document. Make sure they know how to use the control measures that have been provided and when PPE should be changed.

References

1 Control of Substances Hazardous to Health Regulations 1999 SI 1999/437 The Stationary Office 1999 ISBN 0 11 082087 8

2 Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 SI 1994/3247 The Stationary Office 1994 ISBN 0 11 043877 9

3 Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 The Stationary Office 1972 ISBN 0 11 880382 4

4 *The storage of flammable liquids in containers* HSG51 (Second edition) HSE Books 1998 ISBN 0 7176 1471 9

5 *EH40/2002 Occupational Exposure Limits 2002* HSE Books 2001 ISBN 0 7176 2083 2

6 *Safe use and handling of flammable liquids* HSG140 HSE Books 1996 ISBN 0 7176 0967 7

7 *Maintenance, examination and testing of local exhaust ventilation* HSG54 (Second edition) HSE Books 1998 ISBN 0 7176 1485 9

8 *Selecting protective gloves for work with chemicals: Guidance for employers and health and safety specialists* Leaflet INDG330 HSE Books 2000 (single copy free or priced packs of 15 ISBN 0 7176 1827 7)

Further reading

1 *An introduction to local exhaust ventilation* HSG37 (Second edition) HSE Books 1993 ISBN 0 7176 1001 2

2 *The selection, use and maintenance of respiratory protective equipment: A practical guide* HSG53 (Second edition) HSE Books 1998 ISBN 0 7176 1537 5

3 *COSHH essentials: Easy steps to control chemicals. Control of Substances Hazardous to Health Regulations* HSG193 HSE Books 1999 ISBN 0 7176 2421 8

4 *COSHH a brief guide to the regulations: What you need to know about the Control of Substances Hazardous to Health Regulations 1999 (COSHH)* Leaflet INDG136(rev1) HSE Books 1999 (single copy free or priced packs of 10 ISBN 0 7176 2444 7)

5 *Safe working with flammable substances* Leaflet INDG227 HSE Books 1996 (single copy free or priced packs of 15 ISBN 0 7176 1154 X)

6 *Working safely with solvents: A guide to safe working practices* Leaflet INDG273 HSE Books 1998 (single copy free)

7 *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*

8 *Control of Substances Hazardous to Health Regulations 1999. Approved Codes of Practice* L5 (Third edition) HSE Books 1999 ISBN 0 7176 1670 3

9 HSE Information Document 294/49 Use of trichloroethylene in the workplace available on www.hse.gov.uk/toxicsubstances/issue46.htm

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.)

For information about health and safety ring HSE's InfoLine Tel: 08701 545500 Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. You can also visit HSE's website: www.hse.gov.uk

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

Printed and published by the Health and Safety Executive 04/02 TIS7 C100