

Safety with Spray Polyurethane Foam (SPF)

Information Sheet

December 2012

This information sheet provides general information on the use of professional grade high pressure spray polyurethane foam (SPF) regarding chemical health and safety issues for SPF installers.



What is SPF?

SPF is used to retrofit insulation in domestic dwellings and commercial buildings. It is formed through a heat releasing chemical reaction between an **A-sided** chemical (methylene diphenyl diisocyanate (MDI) and MDI based isocyanates) and **B-sided** chemical containing a mixture of polyol, blowing agents, amines and or metal catalysts, surfactants and flame retardants. The composition varies according to the product used. It can take between 23 to 72 hours for the

foam to fully cure, depending on factors such as the composition of the B-side chemicals, the amount of heat dissipated during the reaction and the temperature and humidity of the working environment.

As isocyanates are present, the A-side is considered a greater potential health hazard due to its potential to produce respiratory and skin sensitisation.

Always refer to your supplier's safety data sheet for the complete listing of the composition and potential health effects of A and B side chemicals.

What are the potential health effects from exposure to SPF chemicals?



Occupational asthma may be caused as a direct result of workplace exposure to SPF chemicals containing isocyanates. This can take several weeks to a number of years to show up in the worker. The higher the exposure the more likely the worker has of becoming sensitised. Individuals with a history of asthma should not work in areas with the potential for isocyanate exposure. Skin sensitisation can also occur due to the irritant nature of isocyanates in contact with the skin surface, which may result in dermatitis.

Exposure to B-Side chemical agents can cause a range of adverse health effects. These include coughing, sore throat and runny nose as a result of irritation of the respiratory tract through inhalation. The inhalation of some amine catalysts can temporarily cause foggy vision and halos may appear around bright objects. Irregular heartbeat is also a symptom of overexposure to some blowing agents. Skin contact with amine catalysts may lead to skin sensitisation (dermatitis).

Particular care must be taken if using SPF products containing n-methyl-2-pyrrolidone (NMP) i.e. for spray gun cleaning. NMP is toxic for reproduction. It is also irritating to eyes, respiratory system and skin. Employers should substitute this product for one which is less hazardous to workers.

What protective measures should generally be taken when working with SPF?

With SPF chemicals, it is critical to avoid inhalation and contact with skin and eyes. Workers may be exposed to SPF chemicals at different stages of a job, including handling materials prior to beginning work, during application, trimming, cutting, shaping after application, clean-up, equipment maintenance and dealing with spills. Access to work areas during these tasks should be restricted to workers who are trained to handle these chemicals.

Safe working procedures for SPF chemicals which aim to prevent worker exposure to these chemicals should always be followed. These should include:

- correct handling and storage procedures;
- safe use of personal protective equipment (PPE);
- proper ventilation of the workplace;
- procedures in the event of a chemical spill;
- fire safety;
- first aid; and
- machinery safety.

Workers must be informed about the hazardous properties of all chemicals used including those used for spray gun cleaning. Important sources for safety advice include the Safety Data Sheet provided by suppliers of the chemicals and hazard labels on chemical containers.

All risks to workers must be considered in a written job specific risk assessment. For example, attics and crawlspaces may be considered as confined spaces and would lead to elevated exposure levels.

Also, the application equipment involves the transfer of chemicals under high pressure. This can be very dangerous if a hose develops a leak or ruptures due to wear and tear allowing high pressure spray to be emitted. This can lead to fluid injection injury or other bodily injury requiring immediate medical attention. Hoses and connections should always be checked and handled with care.

Personal hygiene practices are also very important and suitable wash/welfare facilities should be available to workers for the duration of the work activity.

What personal protective equipment (PPE) should be used with SPF?

The type of PPE used must be based on risk assessment but would generally include suitable respiratory protective equipment (RPE), gloves, eye protection, safety footwear and disposable overalls.

Workers must be properly trained to use PPE, especially the use of RPE. With tight fitting respirators the employer must arrange for **face-fit testing** to ensure it correctly fits the worker. Individual factors such as facial hair and use of glasses need to be taken into consideration.

The worker must know how to fit check it properly before each job, how to clean the RPE correctly, check for defects and maintain the RPE to ensure it remains fit for purpose. The worker must also report any defects to their employer.

If the RPE has a separate filter, this must be changed regularly as per manufacturer's instructions.

The foam installer and those in the immediate vicinity (e.g. helper) where spraying is being conducted indoors **must wear full face or hood-type supplied air respirators** to approved European standards and be CE marked.

PPE such as CE marked disposable overalls with attached hood, and nitrile, neoprene, butyl or PVC gloves should also be used when spraying the foam. These should also be used together with appropriate RPE.

What is the role of health surveillance?

Health surveillance is used to prevent occupationally related disease in workers. It allows adverse variations in their health due to working conditions to be identified as early as possible.

As the A-sided chemical used in SPF contains isocyanates, a respiratory sensitiser, health surveillance should be carried out. Health surveillance in this case involves the use of a pre-employment medical assessment (including lung function tests) and routine on going questionnaire and clinical examination. It must be carried out by a doctor experienced in occupational medicine.

Measuring worker exposure to isocyanates

Worker exposure to isocyanates as a result of using SPF can be assessed in two ways. Airborne exposure to isocyanates can be determined using personal air sampling by a competent person and comparing the results with national Occupational Exposure Limit Values (OELVs) or by undertaking appropriate biological monitoring. OELVs and biological monitoring is discussed further below.

1. Occupational Exposure Limit Values (OELVs)

The OELV for isocyanates is 0.02mg/m³ (8 hour time weighted exposure reference period) and 0.07 mg/m³ (15 minute exposure reference period). National OELVs are published by the Health and Safety Authority in the Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. 619 of 2001) and updated periodically.

The Safety Data Sheet supplied with the chemicals should also contain all relevant national OELVs.

2. Biological monitoring guidance values (BMGV'S)

Biological monitoring is in the form of the comparison of the amount of di-amines found in the urine of the worker after exposure to isocyanates with the biological guidance value for Isocyanates (see HSA Biological Monitoring Guidelines). It is the preferable and simplest way of determining the exposure of the worker to isocyanates and the efficacy of worker protection controls. This test is also accurate and cheap. The sample of urine is taken from the worker by a competent person straight after work and analysed in a laboratory. Biological monitoring should be considered under the workers' health surveillance programme.

Key points for employers

The employer must ensure a safe working environment where exposure to SPF chemicals which can cause asthma or other adverse effects is prevented or controlled. The employer should have or provide the following:

- An up-to-date Safety Statement
- A written Risk Assessment for all work activities involving SPF
- Adequate control measures for all exposure scenarios
- Information, instruction and training to employees
- Make available an appropriate health surveillance programme

Key points for employees

Employees are entitled to information about hazards in the workplace and information contained in the employer's Risk Assessment. They are also entitled to information on the protective and preventive measures to be taken.

Employees who are likely to work with and be exposed to respiratory sensitisers and other hazardous chemicals need information, instruction and supervision so that they know and understand the following:

- Label and safety data sheet for chemicals used in the workplace
- Substances which are respiratory sensitisers in workplaces
- Results of the Risk Assessment
- Proper use of control measures including PPE
- Need to report any failures in control measures
- Risks to health
- Symptoms of sensitisation
- Importance of reporting symptoms at an early stage
- Role of health surveillance

What legislation is applicable to my work with SPF?

Safety, Health and Welfare at Work Act, 2005 (S.I. No. 10 of 2005).

Safety, Health and Welfare at Work (General Applications), Regulations 2007 (S.I. No. 299 of 2007).

Safety, Health and Welfare at Work (Construction) Regulations, 2006 (S.I. 504 of 2006).

Safety, Health and Welfare at Work (Confined Spaces) Regulations, 2001 (S.I. No. 218 of 2001).

Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 (S.I. No. 619 of 2001).

Where can I get further information?

You can get related documents below by downloading information from HSA publications webpage at www.hsa.ie.

- A Guide to Respiratory Protective Equipment (RPE)
- Safety Data Sheets (SDSs) information sheet
- Guidelines on occupational asthma and dermatitis
- Your Steps to Chemical Safety
- 2011 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001)
- Isocyanates and dermal exposure information sheet
- Biological Monitoring Guidelines

Further information on safety and health in the workplace is available on our website at www.hsa.ie, our Workplace Contact Unit at 1890 289 389 or the chemicals Helpdesk, email: chemicals@hsa.ie.

Other useful sources of information on SPF

Centre for the Polyurethane Industry (CPI) of the American chemistry council – Health and Safety product stewardship workbook for high-pressure application of spray polyurethane foam www.americanchemistry.com/polyurethane and www.spraypolyurethane.com

NIOSH homepage www.cdc.gov/niosh

OSHA homepage www.osha.gov

Spray polyurethane foam alliance www.sprayfoam.org

ISOPA – European diisocyanate & Polyol Producers Association www.isopa.org

ECHA – European chemicals agency www.echa.europa.eu