

IN•TOUCH

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The Flexible Polyurethane Foam Industry and Worker Safety

To manufacture flexible polyurethane foam, (FPF) substances called isocyanates are reacted with polyols and other chemical raw materials. Isocyanates fully react during manufacturing and aren't present in the finished product.

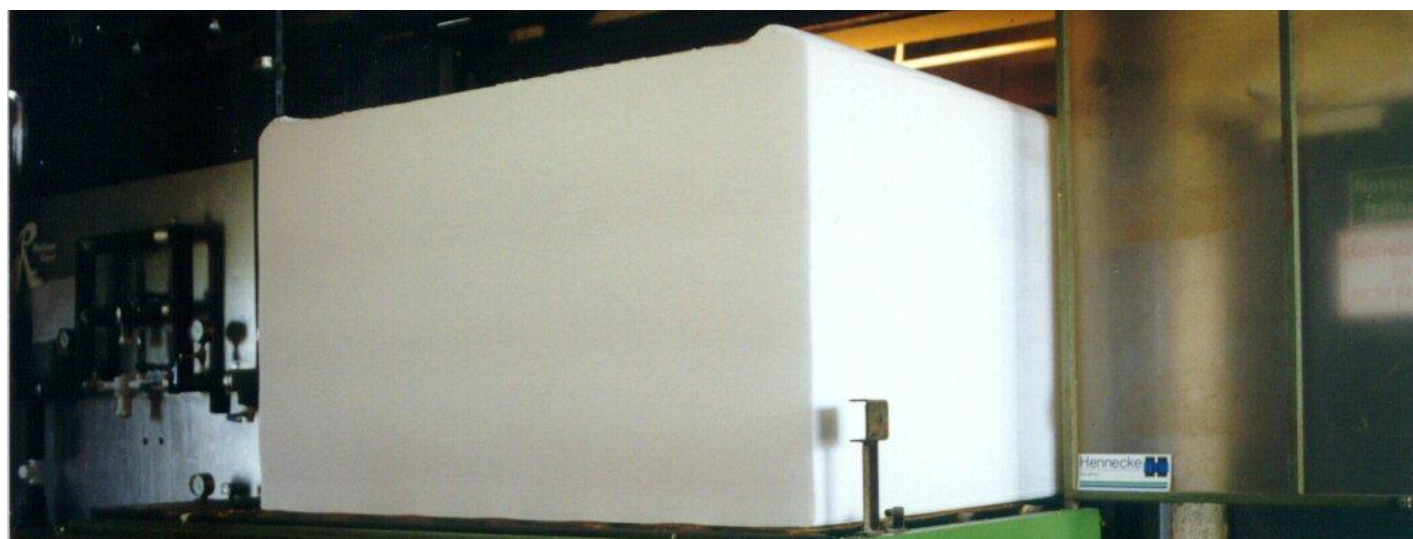
However, in their raw reactive state, isocyanates must be handled carefully to prevent risk of exposure. The flexible polyurethane foam industry has numerous safety practices in place to protect worker health. This issue of IN•TOUCH will explain some of these practices, and how they can provide a safe, efficient manufacturing environment.

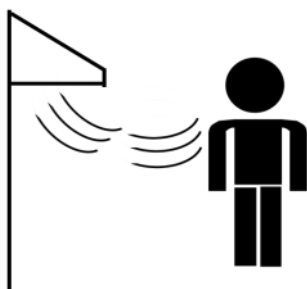
The presence of a material is not the same as risk of exposure.

Typical examples of safety practices:

- Engineered ventilation systems
- Production and off-loading emergency shut off controls
- Stack engineering and scrubber technologies
- Spill and emergency management procedures
- Personal Protective Equipment (PPE) for use in high-concentration areas
- Personal and area monitoring
- Risk management training

Here is an overview of each.





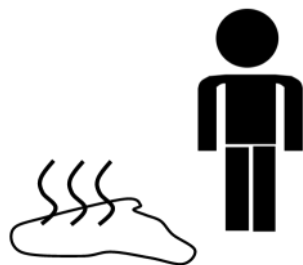
Engineered Ventilation Systems And Stack Controls

In areas where there could be isocyanates in the air, a continual supply of fresh air is provided, and very strong exhaust systems capture and

sweep fumes and vapors from the production line. Flexible polyurethane foam manufacturing consumes almost all isocyanates during the initial chemical reaction. Tests indicate that for each metric ton of FPF produced, no more than 1.6 ounces of isocyanate are emitted and managed as a stack emissions. The emitted isocyanates react readily with relative humidity in the stack, resulting in inert emissions.

Spill Protection

Spills are unlikely because of materials handling systems, sealed storage vessels and heavy gauge piping. Systems are specially engineered to have isocyanate-resistant seals and spill prevention technologies used during unloading and transfer of raw materials. Closed loop systems and monitoring devices with automatic shutoff systems are used to transfer isocyanates, preventing accidental operator error. The chances of spills are remote, but should one occur, specially-trained teams are onsite to safely handle them immediately.

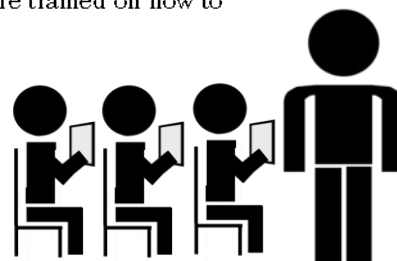


Personal Protective Equipment (PPE)

For employees working in an area where there could be isocyanates in the air, personal protective equipment may be assigned. Employees are carefully trained in the use and limitations, and fitted and tested as necessary.

Training

FPF plant employees are trained on how to safely work in an area where hazardous materials may be present, how to prevent and report accidents, and what to do should an accident



occur. Important safety information from Safety Data Sheets (SDS) and the Global Harmonization System (GHS) are available for employee reference. Training is often proactive; for example, if a shipment of isocyanates arrives at the manufacturing plant, plant employees will meet the truck driver, instruct the driver on proper safety procedures at the facility, and maintain contact with the driver throughout the loading/unloading process.

Medical Checks

As a precaution, employees may be asked to participate in medical surveillance, health surveys and, if the employee will be using PPE, requirements may include a more complete physical exam prior to training, and the completion of PPE fit checks. Medical monitoring provides extra health safety.



Best Practices: Effective Risk Management

Higher concentrations of isocyanates may be found in some foam plant areas. However, higher concentrations do not necessarily result in exposure if precautions are taken.

Precautions may include restricting entrance, monitoring, supplied breathing air, use of PPE where needed, forced air ventilation, and possibly stack engineering and/or scrubbers to provide a clean air environment for workers and the community.

Monitoring Worker Health

For more than 28 years, the Polyurethane Foam Association has surveyed flexible polyurethane foam manufacturers in North America to monitor rates of self-reported and medically confirmed Occupational Asthma (OA), a respiratory illness that includes sensitization from exposure to isocyanates.

Research shows that the incidents of OA among flexible foam workers are consistently lower than national averages for asthma among the general adult population. The flexible polyurethane foam industry understands that worker protection is critical to success. And having systems that protect workers from excessive exposure can be more effective than simply monitoring ambient exposure levels.

The chart below compares self-reported and medically confirmed incidents of Occupational Asthma among flexible polyurethane foam industry workers. The OA survey included companies representing more than 90% of North Ameri-

can production volume.

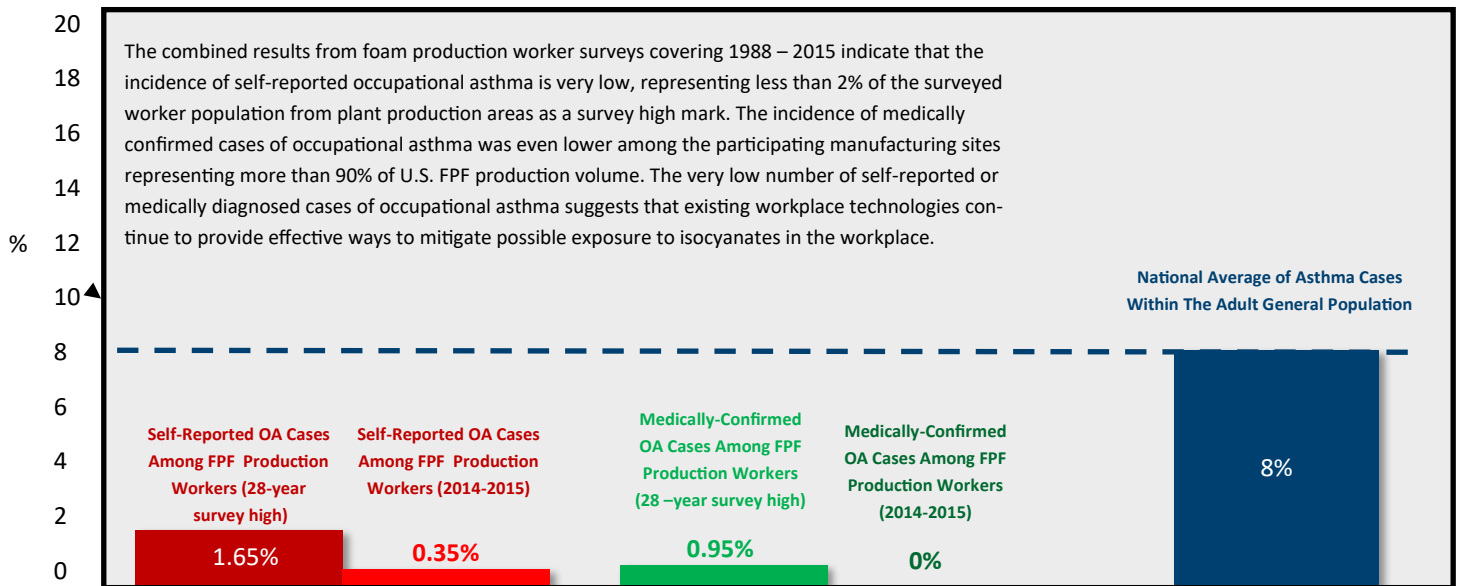
The combined results from foam production worker surveys covering 1988 – 2015 indicate that the incidence of self-reported occupational asthma is very low, representing less than 2% of the surveyed worker population from plant production areas.

The incidence of medically confirmed cases of occupational asthma was even lower among the participating manufacturing sites and currently affects less than 1% of production workers.

The very low number of self-reported or medically diagnosed cases of occupational asthma suggests that existing workplace practices continue to provide effective ways to mitigate potential exposure to isocyanates in the workplace.

The combined data, representing a 28-year history of facilities producing more than 90% of the United States output of flexible polyurethane foam, indicate that these plants operate in a manner that does not contribute to the incidence of occupational asthma. Cases of suspected or medically confirmed occupational asthma are rare among these plants.

Incidence of Occupational Asthma Among Flexible Polyurethane Foam Industry Workers



Source: "A Survey of the Incidence of Occupational Asthma among Flexible Polyurethane Foam Slabstock Plants," McIntyre & Lemon, PLLC

Summary

Flexible polyurethane foam manufacturing uses isocyanates, which must be carefully handled until they are reacted. Isocyanates react completely during the manufacturing of flexible polyurethane foam, and the industry has numerous procedures in place to protect workers from exposure. These include:

- Engineered ventilation and stack controls, which capture vapors during manufacturing to prevent worker exposure.
- Spill protection systems, including closed-loop transfer systems, monitoring devices, and automatic shutoff.
- Personal Protective Equipment (PPE) which protect workers from exposure in areas where there may be concentrations of isocyanates.
- Employee training that allows employees to safely work in an area where hazardous materials may be present, how to prevent and report accidents, and what to do should an accident occur.
- Medical checks, including medical surveillance, health surveys and, if the employee will be using PPE, requirements may include a more complete physical exam prior to training.
- Higher concentrations of isocyanates may be found in some foam plant areas. However, higher concentrations do not necessarily result in exposure if precautions are taken. Precautions may include restricting access, monitoring, supplied breathing air, use of PPE where needed, forced ventilation, and possibly stack engineering and/or scrubbers to provide a clean air environment for workers and the community.
- For more than 28 years, PFA has surveyed flexible polyurethane foam manufacturers in North America to monitor rates of Occupational Asthma (OA), a respiratory illness that includes sensitization to exposure from isocyanates. Research shows that the incidents of OA among flexible foam workers are consistently lower than national averages among the general population.

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