



EUMEPS

Guideline to Prevent Microplastics Emission

Good Manufacturing Practice / Operation Clean Sweep

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INTRODUCTION

Much attention is paid to the release of microplastics into the environment and especially into the sea. As plastic companies, **we have a responsibility** to prevent the release of microplastics and with few and simple tools, we can

- ✓ Preserve the environment
- ✓ Comply with rules and avoid fines
- ✓ Guarantee our employees a safer workplace
- ✓ Optimize efficiency and reduce waste
- ✓ Strengthen company's image and reputation

This **Guideline to Prevent Microplastics Emission** is precisely a review of these tools.

In the following pages the typical activities of an EPS foam manufacturer are examined, focusing on the **events that might cause a pellet/microplastic spill** (inside the plant) **and loss** (into the environment) and how to prevent, contain or remove them.

Each negative event is presented with its **Likelihood** (unlikely, likely, most likely) and the **Consequences for the environment** (minor, relevant, severe).

This guide has been developed by the **Norwegian EPS Association (EPS-Foreningen)** based on «Operation Clean Sweep» and amended by EUMEPS.

Its scope is to provide tools against pellet/microplastics spill and loss during the activity of an EPS converter.

The implementation of the **good manufacturing practices** in it contained, shows the will to join the OCS Pledge (www.opcleansweep.eu) and be part of the wide community of more than 1200 companies around the world who have already signed to.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Control of material (Unlikely/Minor)	Make sure octabins are OK and are stable on the pallet	Visual inspection.	Must be performed as first step.
Transport of octabins (Likely/Relevant)	Check that the truck is in order and that everything works before transporting the octabins. Make sure the storage space is OK and that the transport path is cleared.	Visual inspection.	Must be performed before losing.
Flawed octabins (Unlikely/Severe)	Flawed bins must be assessed before any transport.	Check if the pallet is stable. Assess whether it is possible to move the pallet.	Purchase of straps, training of personnel to cope with such a situation.
Leakage (Unlikely/Severe)	In case of leakage of pellet, this must be collected.	Use vacuum cleaner / broom / central vacuum cleaner.	Purchase + installation.
Collection (Unlikely/Relevant)	Pure pellet can go to production. Contaminated pellet is collected and disposed.	Containers or empty octabins for pure raw material collection and empty octabins for contaminated raw material.	Purchase.

SITUATION:

When receiving raw materials and/or recyclates, first check the load.

Before unloading, check that octabins are upright and undamaged.

It is important whether the cargo is unloaded from behind or from the side.

If the bins are removed from the side, there is a greater risk that the bins may overturn if the load is skewed or displaced on the pallet.

Note: a certified load securing system according to EN 12195-1 or similar may be used to prevent damage of octabins during transportation.

In case transport takes place in containers, only ventilated containers or open-top-containers are recommended.

**RISK:**

- The biggest risk in receiving is whether the cargo overturns. You should therefore ensure that the octabins are stable on the pallet. In some cases, the bins may also crack if exposed to mechanical stress that has weakened the cardboard.
- If a bin overturns or cracks, check if the pentane content in the surrounding areas exceeds the level of risk.
- The pellet on the floor / ground must then be collected immediately.
- Cargo handling and storage can also be a risk.

ACTIONS:

- Visual inspection before unloading is important to prevent accidents.
- Measuring equipment for checking pentane content. In the case of pellet being spilled on the floor or in a car, good ventilation must be ensured if the pentane content in the air is uncertain. Pellet that is not contaminated can be used in production. Contaminated pellet must be collected and disposed.
- Avoid using too long forks on the truck.

NR:

01.2

Situation/Condition/Danger: Raw material and/or recyclates (internal/external) – Internal transport

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Truck with too long forks (Unlikely/Relevant)	Reduce fork length.	Check.	Short forks or similar.
Negligent driving (Unlikely/Severe)	Reduce travel speed with clamping truck.	Check.	Speed bar on trucks.
Too narrow fork guide (Likely/Relevant)	Fork width.	Check.	Adjustable forks.
Truck driving (Likely/Relevant)	Safe handling of goods from warehouse to emptying station which ensures that octabins are not damaged.	Check.	Introduce procedures for truck driving.

SITUATION:

In the production there is internal transport of raw materials, recyclates, semi-finished products and finished goods.
During this transport, undesirable situations may arise.



RISK:

- The biggest risk when operating forklifts is if the load drops. This may be due to excessive speed or too narrow forks.
- In some cases, the octabin may also crack if it has been subjected to mechanical stresses that have weakened cardboard.
- Trucks with too long forks can also damage products.

ACTIONS:

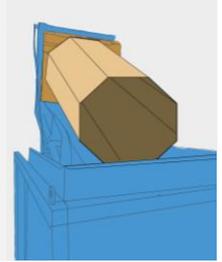
- Transport each product with the most suitable clamping truck.
- Clamping truck must be used when transporting a block.
- Forklift / stacker must be used for palletized products.
- Forklift preferably with custom forks or stacks.
- Procedures and training of truck operator must be performed.
- If a spillage occurs or the octabin overturns, damaged product and pellet must be collected immediately.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Emptying (Likely/Relevant)	Ensure safe emptying to minimize spillage.	Control	Introduce procedures and follow-up for emptying.
Emptying Station (Likely/Relevant)	Physical measures to minimize leakage of pellets on the floor. Keep the emptying station free of spills.	Control	Assess physical improvements and ensure tightness through maintenance procedures and control.
Waste around emptying station (Most likely/Severe)	Ensure that pellet waste on the floor does not end up in the sewage system.	Control	Avoid drains in the immediate vicinity. Easy access to tools and continuous collection and cleaning around the emptying station according to applicable procedures.
Waste management cardboard / internal lining / pallets (Most likely/Relevant)	Establish sorting of all types of packaging.	Checking	Waste stations, waste management procedures, external agreement with environmental station.
Waste remaining in the liner after feeding the pre-foamer (Most likely/Relevant)	Ensure liner is empty	Checking	Regular procedure to clean up liner, to avoid possible dispersion, according to procedures in place in each company's plant.

SITUATION:

Pellet octabins are placed at a dumping station by the truck. Empty packaging (octabin, inner plastic and pallet) must be further handled for recycling.

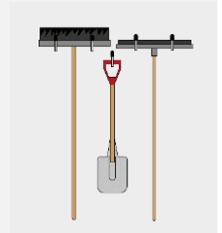
Octabin liners with residual pellet left after feeding the pre-foamer must be collected and handled to avoid any dispersion of pellet into the environment, according to the procedures adopted in each plant.

**RISK:**

- There is a risk pellet spill around the dumping station.
- Also a risk of damage of the octabin.
- And finally a severe risk of losses into the environment.

ACTIONS:

- Good and safe emptying of the plastic bag / internal lining of the octabin reduces waste of pellets on the floor. The emptying station should be reviewed for leaks and higher edges that minimize leaks during the emptying process should be considered.
- Equipment maintenance procedures.
- Avoid any drains near the emptying point.
- Plastic film, internal lining and cardboard are collected.
- Cleaning equipment is readily available and there are procedures to ensure that pellets do not remain on the floor over time. If possible, the pellet is recycled.
- Well-marked and fixed places for sorting empty packaging for recycling.
- Work instructions for regular cleaning of this area

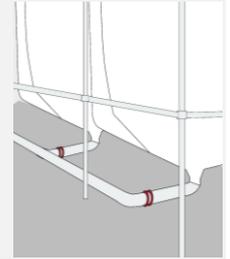


Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Spills in pipe joints and transfers (Unlikely/Minor)	Checking pipe joints with gasket, secure pipe suspension.	Inspection.	Check procedures for gaskets, pipes and pipe joints.
Emissions from pre-expansion / expansion (Likely/Relevant)	Install filter in ventilation over the roof, filter in drain and grate on the floor.	Inspection .	Continuous control of filters in drains, floor grating and roof filters.
Remove dust on silos, floors and other equipment (Unlikely/Relevant)	Use tools like central vacuum cleaner or individual vacuum cleaner. Sealed containers for collected dust and plastic balls.	Regular check.	Procedures for daily collection, cleaning and waste management.
Avoid spills ends into drains (Unlikely/Minor)	Drain and grate filter.	Inspection .	Procedures for checking filters and grates on the floor.
Waste of pellets in the expansion room (Likely/Minor)	Appropriate tools.	Inspection.	Daily cleaning / collection procedures.

SITUATION:

Pre-Expansion, transport and intermediate storage of foamed EPS beads.

Transport takes place with fans that blow the material through pipes into storage silos.

**RISK:**

- Emission into water and air.
- Holes in pipes and joints or clogged pipes can cause leakage.
- Silos made of nylon fabric can be damaged.
- Material may end up in the environment or in drains.
- Dust is collected on silo tops and on floors, in silo storage and expansion rooms.

ACTIONS:

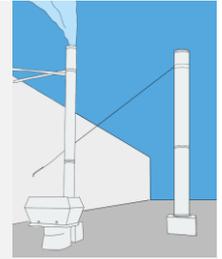
- Maintenance procedures to avoid pipe leaks.
- Tube with gasket. Securing hanging pipes. Procedures for checking pipes and joints. Control of silos. Replace old and worn silos.
- Maintenance procedures for filters and appliances to prevent roof leakage.
- Install filters in the vent over the roof, coming from the foaming and drying station. Procedures for checking and cleaning filters.
- Removing external dust on silos and other equipment.
- Procedures for daily collection of wastes in expansion rooms and storage.
- Good tools such as vacuum cleaner.
- Dense containers for collecting dust and EPS beads.
- Install filter to prevent spillage from entering the drain.
- Work instructions for regular cleaning of this area

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
In general (Likely/Relevant)	Mount filters in ventilation over the roof.	Inspection.	Continuous control of roof filter.
Pre-expansion / expansion (Unlikely/Severe)	Effective filter in the "drying beds" on foams and fixed cleaning procedures for these.	Inspection.	Procedures and follow-up for inspection and cleaning.
Silos (Unlikely/Relevant)	Ensure suction/ventilation in the silo, so that the microplastics are not sucked up in the exhaust.	Inspection.	Procedures and follow-up for inspection and cleaning.
Block moulding (Most likely/Severe)	Dust and powder catchers on the exhaust due to excess vacuum and steam from the block moulding process, so that powder is collected before air is released into the environment.	Inspection.	Procedures and follow-up for emptying and inspecting dust and beads.
Shape moulding (Most likely/Severe)	Dust and powder catchers on vacuum and vapor emissions from the moulding process so that dust and beads are collected before air is released into the environment.	Inspection.	Procedures and follow-up for emptying and inspecting dust and beads.
Room ventilation (Unlikely/Relevant)	It is important to have a good system that ensures preventive maintenance of the filters at the beginning of the extraction.	Inspection.	Fixed procedures for checking and changing bags, filters and other forms of air purification.

SITUATION:

The biggest source of emissions to the air is from the chimneys of pre-expansion and block moulding. Plastic dust and powder are mixed in excess steam and vacuum from the machines, which often have exhausts on the factory roof.

Here the plastic is blown out into the environment. A secondary source of air emissions is the ventilation from the silo stores, where loose pellets can be sucked into the room's ventilation and blown out.

**RISK:**

Plastic dust may blow into the air if not filtered or otherwise cleaned. The foamed beads are very visible. If the ventilation has filters, failure to maintain them can cause unwanted losses. Operator errors, process errors and lack of procedures for checking and replacing filters can also result in unwanted spills.

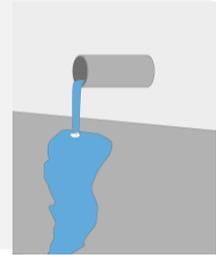
ACTIONS:

- Preventive Maintenance: with regular procedures for checking and replacing grilles, filters and other forms of air purification.
- Effective filter in "drying beds" on foams and fixed cleaning procedures for these.
- Dust and powder catches on ventilation for excess vacuum and steam from molds and block casting processes.
- Ensure extraction / ventilation in the silo layer so that the EPS beads are not sucked into the ventilation.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Wastewater through filters (Likely/Severe)	Different types of equipment are considered.	Take measurements.	Mounting of fine-mesh filters that collect beads and microparticles.
Drain and wells are fitted with filters (Likely/Severe)	Review of all drains and wells for establishing proper filter equipment.	Inspection.	Mounting of grates / filters. Good procedures for cleaning before beads may end up in drains.
Cleaning filters (Likely/Severe)	Cleaning and replacing filters.	Inspection.	Establish procedures for cleaning and replacing filters.
Control of wastewater, procedures and sampling (Likely/Severe)	Conduct continuous third-party sampling of the wastewater for control.	Sampling.	Establish procedures for checking at agreed intervals for submission to external laboratories.
Dredging (Likely/Severe)	Sludge suction is carried out regularly.	Control.	Establish agreement with external company on how often and which drains should be emptied.

SITUATION:

In connection with EPS foam production, water is used, both in the form of steam and for cooling.

**RISK:**

There is a risk that wastewater from production contains both particles (foamed beads, pieces of foam) and microparticles (raw materials, additives). Where wastewater is sent directly into the environment the need for filtration must be assessed.

ACTIONS:

- Mounting of filters in drains. When installing mechanical filter systems, most of the particles can be removed by filtration. There are various systems in the degree of filtration.
- Checking drains by submitting samples.
- Sludge suction of wells at regular intervals.
- Establishing good procedures for checking machines to prevent particles from getting into the cooling system.
- Establishment of filters in wells and drains that collect microplastics, where the wastewater is emitted to the environment.
- Regular inspection of the bank area of nearby surface water.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Production with quality defects (Unlikely/Minor)	Production with quality defects is transported to the recycling department.	Control.	Clearly defined areas where products with quality defects can be handled properly.
Damaged products (Likely/Minor)	Production with quality defects is transported to the recycling department.	Control.	Clearly defined areas where products with quality defects can be handled properly.
Moulding errors (Likely/Minor)	Quality control of equipment.	Inspection.	Establish work procedures.
Labeling errors (Unlikely/Minor)	Quality control of equipment.	Inspection.	Establish work procedures.

SITUATION:

During the production of EPS, production error can occur.

**RISK:**

In the production of EPS, quality errors, damage and scrap can occur:

- If EPS sheets and other EPS scraps are not properly collected, there is a risk that the waste cannot be recycled with minimised emissions in the factory.
- Risk of dust during grinding / granulation.
- Granular waste in and near the production machines.

ACTIONS:

- Procedures to minimize errors in production.
- Procedures for grinding / granulating and recycling defective production.
- Procedures for continuous collection of damaged products and scrap for regrinding and recycling.
- Procedures for the collection of beads and dust in connection with recycling.
- Agreements with local waste disposal company to secure non-recyclable waste.
- Storage of scrap only in rooms or closed containers
- Work instructions for regular cleaning of this area

Handling of finished products

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Truck driving (Likely/Relevant)	Pro-active work, procedures and training that minimize damage and unwanted waste.	Continuous control.	Procedures for truck driving. Training and follow-up for employees.
Handling equipment (Likely/Relevant)	Proper equipment for work.	Systematic control.	Forks that are not longer than the length of the product. Short forks. Clamping unit.
Finished goods storage and loading area (Very likely/Relevant)	Correct marking of storage area.	Systematic control.	Mark storage areas. Fencing area. Finely masked nets at the bottom of fences that collect EPS pieces. Cleaning procedures and equipment.
Cargo loading (Most likely/Relevant)	Safe loading and load securing that minimizes the risk of spillage during loading, during transport and on site.	Systematic control.	Training of employees. Procedures for loading. Set requirements for carriers.
Waste management (Most likely/Relevant)	Ensure that as much waste as possible goes to recycling. Sorting of packaging waste.	Systematic control.	Waste stations, waste management procedures, external agreement with a waste disposal company.

SITUATION:

Transportation of finished goods from production lines to stocking area.

Finished goods storage. Shipping of finished goods. There is a risk of damage for finished products during all handling processes, which will result in unwanted spills.



RISK:

- Products can be damaged during transport by a forklift.
- Waste can get lost in storage areas.
- If EPS sheets and other EPS waste remain, there is a risk that the waste cannot be recycled in the factory.
- Poor cargo protection can lead to damage and waste during transport to customers / construction site / construction market.

ACTIONS:

Inside:

- Positive attitudes among employees. Good procedures for forklift driving.
- Proper handling equipment minimizes risk of damage to finished products.
- Selected and defined storage areas ensure good order.

Outside:

- Weather and wind protection. Fine mesh at the bottom of fenced areas prevents small fractions from escaping. Cleaning tools and procedures.
- Regular inspection of the fenced area to detect sources of contamination at an early stage.
- Waste sorting ensures that most EPS waste is recycled in the factory.
- Attitude-building work and training of employees to secure products.

Carrier requirements:

- Provide advice and procedures to the carrier during the loading process.
- Report discrepancies if necessary.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Plastic and cardboard packaging (Likely/Minor)	Sort and deliver to approved receiving point.	Systematic control.	Procedures for sorting, fixed and defined spaces for storage and delivery to an approved receiving place.
Used pallets (Unlikely/Minor)	Collect and sort for recycling.	Systematic control.	Procedures for sorting, fixed and defined spaces for storage and delivery to an approved receiving place.
Crashed pallets and other wood (Unlikely/Minor)	Collect in container and deliver to approved receiving place.	Systematic control.	Procedures for sorting wood and delivering to an approved location.
Dust from storage room location (Likely/Relevant)	Compress or assemble in sacks to approved receiving place.	Systematic control.	Procedures to ensure that dust is picked up, stored and delivered to approved reception.
Clean EPS waste (Unlikely/Minor)	Recycle.	Systematic control.	Necessary equipment for recycling EPS.
Contaminated EPS waste (Likely/Relevant)	Compressed and delivered to approved reception location.	Systematic control.	Own compactor. Delivered to approved receiving point.

SITUATION:

In the production of EPS foam there are different types of waste, such as plastic, cardboard and wood, as well as EPS dust and microgranules.

Raw material octabins contain plastic, cardboard and wooden pallets to be sorted at source.

After feeding pre-foamer, octabin liners contain residual pellets, that must be collected and treated to avoid any loss into the environment (see also Issue 01.3).

There will be dust and other wastes from production to be assembled.

**RISK:**

Waste can go astray. Pollution of areas in and around the factory, in drains, outdoors and further into the environment.

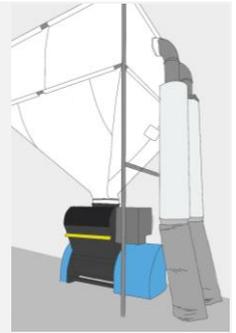
ACTIONS:

- Good procedures for source sorting of plastic and cardboard.
- Delivery to approved receiving station.
- Pallets and other woodwork are placed in the right place.
- Crashed pallets and other waste, in proper garbage containers.
- Establish environmental stations with separate collection purposes.
- Establish an approved waste plan.
- Storage of waste of foamed material only in rooms or closed containers.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Pre-expansion / expansion (Unlikely/Severe)	Effective tablecloth / filter in the "drying beds" on foams and fixed cleaning procedures for these.	Inspection.	Procedures and follow- up for inspection and cleaning.
Silo (Unlikely/Relevant)	Ensure suction / ventilation in the silo so that beads are not sucked up into the extraction.	Inspection.	Procedures and follow- up for inspection and cleaning up.
Tools / scrap plant (Most likely/Relevant)	Effective dust separators and bag filters on grinders and scrap plants.	Inspection.	Procedures for inspection and cleaning of the filter.
Block moulding (Most likely/Severe)	Dust and bead catchers on extract from excess vacuum and steam from the block casting moulding, so dust and beads are excreted before air is released into the wild.	Inspection.	Procedures and follow- up for emptying and inspecting dust and beads.
Moulding (Most likely/Severe)	Dust and powder catchers on vacuum and steam emissions from the moulding process, so dust and beads are excreted before air is released into the wild.	Inspection.	Procedures and follow- up for emptying and inspecting dust and powder catchers.
Room ventilation / Production plant (Unlikely/Relevant)	It is important to have a good system that ensures prevented maintenance of motorized filters in the inlet of the filters.	Inspection.	Fixed procedures for checking and exchanging sieves, filters and other forms of air purification.

SITUATION:

The largest source of dust emissions from an EPS foam production is granulation of scrap and cut off from production facilities. Plastic dust is generated when EPS is granulated and mixed in the transport air into the piping systems, which may pass on the roof or out of the factory, and the dust blows into the environment. Another source of dust emissions to air is the mixture of scrap and new raw materials in the moulding process, where dust is released from the mixer silo / mixing station and enters the exhaust or room ventilation and is blown out into the environment.

**RISK:**

Plastic dust in process air, vacuum and excess steam is blown out into the external environment without any of these emissions passing through a filter, grate or other type of air purifier. In particular, the grinders produce a lot of dust and contribute to air pollution and microplastics in the environment. If the grinders and ventilation systems have bag filters or other types of filter systems, their lack of maintenance can also cause undesirable emissions. Operator errors, process errors and lack of procedures for checking filter bags / filter replacement can also result in unwanted dust and microplastics spills.

ACTIONS:

- A good system for preventive maintenance with fixed procedures for checking and replacing bags, filters and other forms of air purification.
- Effective dust separators and bag filters on the grinders and scrapers with fixed cleaning procedures.
- Dust and beads catchers on excess vacuum and steam from moulding processes, so dust and beads are separated before air is released.
- Ensure extraction / ventilation in the silo storage so that dust sucked up is trapped in the extraction / ventilation.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Accidental handling (Likely/Severe)	Notification of accidental circumstances. Identification and quantity of the spill, including all information to assess the impact of the accident on health and the environment. What measures have been taken.	Factory management reporting.	In the absence of procedures, new routines must be established. The procedures are reviewed.
Who must be notified (Unlikely/Minor)	Notification according to procedures.	Reporting.	If there is a lack of procedure this must be established clearly.
Clearing / collecting. Frother – Block Moulding Machines - Silo – Storage - Other area inside and out (Likely/Severe)	Equipment must be available. Brooms - buckets-vacuum bags - containers etc.	Cleaning.	Establish necessary procedures, conduct training, define timeline, and follow up on its execution.

SITUATION:

There are several possible accidents that may occur with the production of EPS foam. Production combines, among other things, truck driving, heavy machinery use, a noisy environment. All of these elements can contribute to accidents.

**RISK:**

Accidents of various kinds may occur at all stages of production.

We must constantly strive to act as safely as possible in what we do.

ACTIONS:

The most important measure is to provide thorough training, ensure that all employees have the right skills and verify that we have an updated system of instructions and routines. It will reduce the likelihood and possible consequences of an accident.

- Ensure proper handling of equipment.
- Make sure that we meet regulatory requirements regarding machine safety.
- Ensure good maintenance and replacement of bad equipment to maintain safety.
- Cleaning and cleaning up.
- Good marking of areas.
- Use of protective equipment.
- Good attitudes.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Handling of equipment (Likely/Minor)	All equipment is secured in accordance with regulations.	Inspection.	Procedures and training.
Maintenance and replacement (Likely/Minor)	Preventive maintenance of machines and equipment.	Maintenance.	Procedures for continuous supervision.
Marking of areas (Likely/Minor)	Areas of risk of accidents are clearly marked.	Systematic control.	Use warning signs, fencing and marking paint.
Safety (Most likely/Minor)	Proper safety equipment.	Systematic control.	Training and use of safety equipment.
Attitude (Most likely/Minor)	Training.	Systematic control.	Repeated training.
If an accident occurs (Most likely/Minor)	Knowledge of notification.	Systematic control.	Establish necessary notification procedures and make sure that all employees know about them.

SITUATION:

There are several possible accidents that can occur in EPS production.

The production combines both truck driving, heavy machinery use, in a noisy environment.

All of these items can cause personal injury.

**RISK:**

Accidents of various kinds can happen at all stages of production. We must constantly strive to act as safely as possible in what we do.

ACTIONS:

The most important measure is to provide thorough training, ensure that all employees have the right competence and verify that we have an updated system of instructions and procedures. It will reduce the likelihood and possible consequences of an accident.

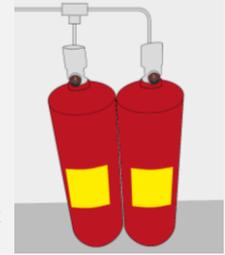
- Ensure proper handling of equipment.
- Make sure that we meet regulatory requirements regarding machine safety.
- Ensure good maintenance and replacement of bad equipment.
- Cleaning and cleaning up.
- Good marking of areas.
- Use of protective equipment.
- Good attitudes.

If the accident occurs:
handle personal injury according to the law.

Negative Event Likelihood / Consequences	Actions	What to do	Proposal for solution
Building in general (Unlikely/Severe)	Evaluate whether all sections of buildings are ok in terms of fire risk.	Control inspection.	and Pentane measurements to detect high concentration of gas. Sprinkler systems, ventilation, alarm systems, thermography of electrical systems.
Hot work (Unlikely/Severe)	Through procedures, ensure that working with hot objects takes place properly.	Inspection.	Pentane measurements and fire guard during work. Specific room for work not to be done into the factory.
Production equipment (Most likely/Severe)	Consider whether there are separate areas with increased fire risk that need extra action.	Systematic control.	Local sprinkler systems or other risk mitigation measures on cutting lines. Thermography of electrical panels. Procedures for cleaning the switchboard. Checking and securing grounding
Cleaning (Most likely/Severe)	Ensure that old dust is not left in inaccessible places, such as on top of storage silos, as a source of ignition.	Control.	Cleaning procedures.
Fire fighting equipment (Most likely/Severe)	Proper fire extinguishing equipment located in relevant places. Regular fire drills with employees.	Training.	Review of fire extinguishing equipment. Fire extinguishing equipment service agreement .Good training routines regarding fire safety .Regular exercises.

SITUATION:

EPS is a combustible material. Pentane is the propellant in the production process. The gas is flammable and heavier than air. EPS sheets are usually manufactured on cutting lines where filaments melt through the product. (*) Fire hazard procedures are not strictly related to OCS, but they cover a relevant part in GMP. Here are some indications regarding Fire Safety which must be adapted according to local regulations and procedures adopted by each company. It must be reminded that in case of fire, pellet loss may easily occur, i.e. through water hydrants used to extinguish fire.

**RISK:**

Be aware of anything that can trigger a fire. Particular attention should be paid to pentane in premises, electrical installations, dust, hot work and cutting lines. There is a risk that water from the fire extinguisher / sprinkler system can lead microplastics / pellets into surrounding areas in case of fire.

ACTIONS:

- Provide hot work procedures. Pentane measurements and fire fighters can be good tips.
- Room ventilation for reducing pentane values in the air.
- Sprinkler systems in the premises.
- Safe drainage with fine mesh to filter water from triggered sprinkler system.
- Further measures in exposed areas (eg cutting lines). Examples of this could be local sprinkling at the cutting station and / or sensors that ensure that tension on cutting threads is interrupted at product stoppage. Avoid cutting into fresh blocks. These have higher pentane content. Electrical control including thermography of electrical installations. Cleaning / service procedures that include control cabinets, electrical cabinets and other electrical installations. Check / replace microfilters regularly in ventilated control cabinets. Remove old dust that remains in hard-to-reach places.

Core requirements



Operation Clean Sweep®

Operation Clean Sweep® is the solution as a product stewardship programme supported by EUMEPS and the whole EPS value chain.

When the industry handles microplastics responsibly:

- Pellets are kept out the environment.
- Companies enhance their reputation.
- More material becomes product rather than waste.

This manual provides all necessary information and tools needed to launch an employee outreach programme.

Before adopting any of the *good manufacturing practices* described in this Guideline, it is important to fulfill 5 basic steps:

1. Commit to making zero microplastics loss a priority

- ✓ Sign the "OCS Pledge"

2. Assess the company's situation and needs

- ✓ Determine if appropriate facilities and equipment are available
- ✓ Determine if employees are following appropriate procedures

3. Make needed upgrades in facilities and equipment as appropriate

4. Raise employee awareness and create accountability

- ✓ Establish written procedures and produce reminders (posters, stickers, etc.) to be displayed in site
- ✓ Conduct regular employee training
- ✓ Assign employees the responsibility to manage microplastics containment

5. Follow up and enforce procedures

- ✓ Conduct routine inspections to monitor compliance of the agreed procedures

It is also important to develop a **Risk Mapping** to identify the areas where spills/losses occur most frequently and fix them in a written **document**.

The **worksite** must be properly **set up** to prevent losses and assist cleanup, deciding which steps are required (i.e. to pave or not, vacuum systems, install containment systems, access to cleaning instruments, etc.)

Training programmes raise awareness over the impact of microplastics, help define the responsibilities among employees, reaffirm or develop new procedures, encourage teamwork, are the occasion to present reminders (posters, fliers, documents, stickers) and reward employees who have achieved goals.