Chemicals Management Guide & Training for Manufacturers

1 — Last update: 2018/10/02

Table of Contents

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Limitations

This Guide is **not a substitute for applicable local laws and regulations**. It is expected that companies will comply fully with all applicable laws, regulations, and permits relating to chemicals and environmental management as well as occupational health and safety.

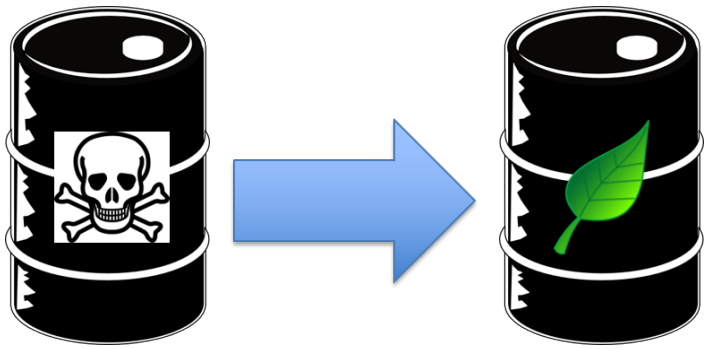
This Guide may not address all hazards or risks associated with the use of chemicals in your company. It is recommended that companies employ or consult with external environmental health and safety and/or chemicals management experts to fully understand all hazards and legal obligations.

2. Introduction

Chemicals are necessary for the manufacturing of products. In many cases, however, the same qualities that make these chemicals useful in the production process may also pose serious risks to the health and safety of workers and the surrounding environment.

The Outdoor Industry Association or OIA, and its member brands are committed to driving industries toward the use of safer and better-understood chemical options. We are also committed to providing the necessary support and tools to our supply chain partners to ensure that chemicals are managed responsibly throughout their entire life cycle and that workers and the surrounding environment are protected from any unnecessary risk.

This Guideline has been created to support the OIA's mission of driving improvements in chemicals management, and provides guidance, tools, and good practice examples that may be used to understand, develop, and support continuous improvements in chemicals management programs that will result in the mitigation of risks related to the use of hazardous chemicals in manufacturing facilities.



2.1. How to Use This Guide

Uses

This Guide can be used as a supplement to enhance chemicals management performance and reduce risks to your organization, customers, workers, and the surrounding environment. It is freely available and intended to be applicable to any type of manufacturer, with apparel, footwear and outdoor-specific scenarios included as appropriate.

This guide is ***not*** intended to specify any individual brand's requirements. However, many brands have similar expectations for manufacturer partners, for example, that they have in place:

- A dedicated person or team overseeing chemicals management.
- A chemicals management policy.
- A process to review chemicals prior to purchase.
- A process for chemical inventory management that includes a chemical inventory list (CIL) of all chemicals on site and GHS compliant SDS for all processing chemicals.
- EHS processes for assessing and controlling chemical hazards in the workplace and beyond (i.e. PPE, ventilation, hazardous waste).
- A process to ensure regulatory and RSL compliance.

Manufacturers may find this guide useful in the following ways:

- Facility managers may use to deliver targeted trainings/workshops on site (at facility) OR online (either independently, or in partnership with qualified 3rd party trainers).
- Corporate-level managers (e.g. corporate social and environmental officers) may use to develop chemicals management strategy and implementation plans, and track progress/actions.
- Manufacturers (e.g. T1) may provide to upstream manufacturers (T2, e.g. factory-sourced materials) as a key reference to guide improvements and track progress/actions.

Brands may find this guide useful in the following ways:

- To provide to manufacturer partners as a key reference to guide improvements and track progress/actions in priority aspects of an overall chemicals management program.
- To deliver trainings/workshops on site (at facility) OR online (either independently, or in partnership with qualified 3rd party trainers).
- To educate/train brand staff who routinely interact with and visit facilities, e.g. product line managers, corporate social and environmental managers, etc.

Navigation

This Guide includes various tools to help develop and implement chemicals management programs. A description of the features and tools included in this Guide is provided below:

- **Links and References**
  Quick links and references are provided throughout the Guide that direct you to helpful external resources or other sections of the Manual that contain relevant information or resources. Simply click on the link and you will be directed to the resource or topic within the Guide. To go back to the previous page, simply click “Back” in your browser window.

- **Sample Documents and Templates**
  In some sections, links to documentation samples or template have been provided. These documents can be downloaded and used to create internal chemicals management documentation.
  Note: *Sample documents and templates are intended to serve as basic examples, and will need to be modified to fit the relevant scope and requirements of your chemicals management program (i.e. applicable regulatory requirements, site-specific roles and responsibilities, actual workplace practices, etc.)*

- **Checklists**
  To simplify and emphasize important aspects of a chemicals management program, reference checklists have been created that can be downloaded and used as a self-assessment tool or list of tasks/procedures for supervisors and employees to follow to ensure that proper chemicals management practices are in place.

- **Training Materials**
  Links to sample training materials can be found at the end of each section of the Guide. These include PowerPoint slides and activity documents that can be downloaded and used as part of your chemicals management training programs.
  Note: *It is recommended that the provided materials be used as a base, and that site-specific training programs be customized to meet internal/external training objectives and attendee needs.*

Icons

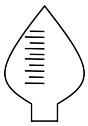
 – Indicates an external link to another website.

 – Indicates a sample text document such as a written policy, procedure, or template.

 – Indicates an available checklist document.

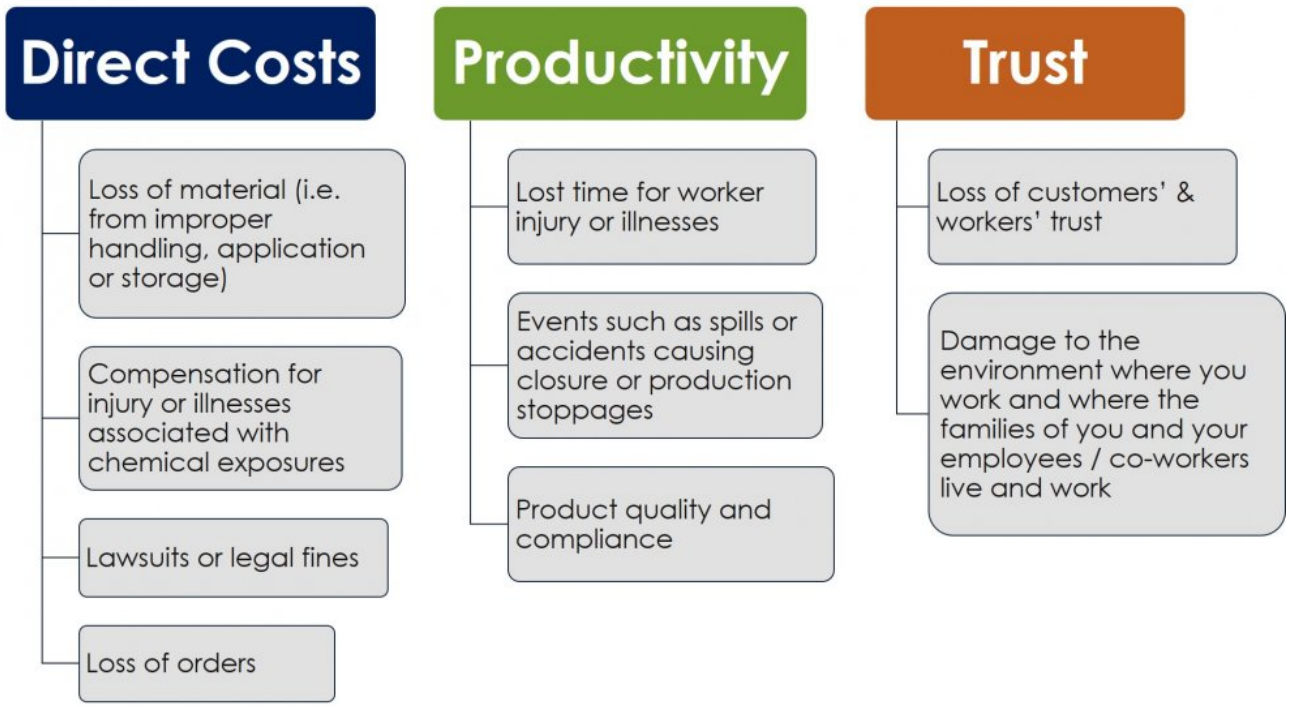
 – Indicates available presentation materials (typically a Microsoft PowerPoint file)

 – Indicates available training activity files. These activities complement the presentation materials by providing case studies, scenarios, group work, etc.

 – Indicates relevant Higg Index Facility Environment Module (FEM) 3.0 indicators

2.2. Benefits of Chemicals Management

Responsible management of chemicals reduces the risk of harmful exposure to workers, the environment, and customers. Increased awareness and concerns regarding these risks have resulted in legislative action, supply chain commitments, and heightened industry focus on chemicals management. Some of these risks are outlined in the figure below:



A demonstrated commitment to responsible chemicals management provides your business with a clear competitive advantage, as effective chemicals management programs reduce the direct and/or potential costs associated with these risks. The adoption of more sustainable practices ensures future success and growth for your business!

2.3. Industry Tools for Chemicals Management

A wide variety of industry initiatives and tools are available to assist with the responsible selection, management, and use of chemicals. Links to some helpful tools and information are provided below. Suppliers are also encouraged to research and utilize any other industry tools and guidance that may be available.

- bluesign®
- Sustainable Apparel Coalition (SAC) – Higg Index
- Other Helpful Tools & Resources

2.3.1. bluesign® Technologies AG

bluesign® is a leading global system for managing the environmental impacts of textile production through management of inputs and outputs. The bluesign® standard is a textile certification system that works to prevent chemicals of concern from entering materials at each step of the manufacturing process.

bluesign® provides a variety of tools, resources, and guidance which can be used as a supplement to this Guide, and to assist with the implementation of best practices for the responsible management of chemicals and reduction of environmental health and safety (EHS) risks The tools include the following:

- **blueguide**: A database of approved materials
- **bluefinder**: A database of approved chemicals
- **bluesign system substances list (BSSL)**: A list of chemicals that are currently banned or restricted in manufacturing and/or finished materials
- **bluesign Infocenter**: A database of reference information, including guidance on EHS criteria for production facilities

More information on the bluesign® resources noted above can be be found using the following links:

bluesign® Website

bluesign® Infocenter & Downloads

Version 7.1 of the BSSL

bluesign®, Criteria for Production Sites, Version 2.0

Note: Only bluesign® system partners can access the bluefinder database of approved chemicals. If your company is not a bluesign® system partner, you may contact your respective brand partner to gain access (if available) to bluefinder® information without pursuing full system partnership.

2.3.2. Sustainable Apparel Coalition (SAC) – Higg Index

The Sustainable Apparel Coalition (SAC) is the apparel, footwear, and home textile industry's foremost alliance for sustainable production. The Coalition's primary focus is on developing the Higg Index, a standardized supply chain measurement tool for all industry participants to understand the environmental and social and labor impacts of making and selling their products and services. With a particular focus on environmental impacts (including chemicals management), the Higg Index Facility Environment Module (FEM) self-assessment tool provides a starting point and improvement framework designed to help facilities to evaluate current and potential risks and recognize opportunities for sustainable improvement.

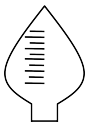
The SAC has also created a How To Higg Guide for the FEM that provides guidance and information on the FEM self-assessment questions and requirements.


SAC – Higg Index


SAC – How to Higg

Where relevant, Higg FEM 3.0 Indicators related to chemicals management are listed in each appropriate section to assist you. This will appear as follows (EXAMPLE):

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:


Chemicals Management – Level #: Question #

In addition to chemicals management, the FEM also focuses on other areas of environmental impacts and resource consumption (some of which are addressed in this Guide), including:

- Environmental Management Systems
- Energy and Greenhouse Gas Emissions
- Water Use
- Wastewater
- Emissions to Air
- Waste Management

2.3.3. Other Helpful Tools/Resources

The links provided below contain additional information and reference tools intended to assist in the development of a responsible and sustainable chemicals management program. Additional links are provided in later sections of this Guide where relevant.

In addition to the following resources, manufacturers are encouraged to research and utilize other industry tools and guidance that may not be referenced in this Guide.

 Global Social Compliance Programme (GSCP) – Reference Tools

 Sustainable Textile Production (STeP) by OEKO-TEX®

 Zero Discharge of Hazardous Chemicals (ZDHC) – Programme & Tools

 International Finance Corporation (IFC) Environmental, Health and Safety Guidelines

2.4. Downloadable Training Materials – Introduction

Powerpoint Slides

Introduction to Chemicals Management

Activities

Activity: Improving Chemicals Management

3. Chemicals Management Systems

The foundation of an effective chemicals management program depends on the establishment of policies and procedures to appropriately manage chemicals throughout their life cycle. For each stage in the life cycle, policies and procedures that define legal and other requirements, responsible persons, and appropriate work practices and controls need to be developed.

Part of managing chemicals is also being able to identify and eliminate hazardous chemicals at the beginning stages and preventing them from entering the production process (input stream management). By considering hazard prevention solutions in addition to hazard control, it is possible to create more positive outcomes for consumers, workers, and the environment.

An effective chemicals management system will have in place policies and procedures addressing the following:

- Chemical procurement and purchasing
- Compliance with applicable regulatory requirements and lists of restricted substances
- Hazard communications within the organization
- Safe storage, handling, use, and disposal of chemicals
- Control systems to prevent worker and environmental exposure to chemicals

Chemicals Management Life Cycle

Framework and certification from internationally recognized management systems such as ISO 9001 or ISO 140001 may be referenced and/or utilized in developing your own chemicals management program.

International Standards Organization [ISO]

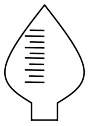
3.1. Policies & Procedures

When creating your chemicals management policies and procedures, the following questions should be carefully considered:

- Have you identified all applicable legal and customer requirements?
- Have you established clearly-defined roles and responsibilities for staff?
- Will your policies/procedures cover all aspects of the chemical management life cycle within your organization (i.e. purchasing, storage, etc.)?
- How will we track and measure performance or compliance?
- Does top management understand the requirements of your policies and procedures, and are they committed to providing the resources necessary to fulfill them?
- How and when will these policies and procedures be communicated to staff? Who will provide training and instruction?
- How and when will your policies and procedures be reviewed? Who will conduct the review?

Chemicals Management Policy Sample

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:



Chemicals Management – Level 1: Question 8

3.2. Regulatory Compliance

As you develop your chemicals management system, it is important to know and understand which regulations do and do not apply to your company. Numerous regulations exist for chemical, occupational, environmental, and product safety. In order to ensure your company is aware of all applicable legal requirements, procedures should be in place to accomplish the following:

- The assignment of dedicated staff members to the monitoring of applicable chemicals, environmental, and product safety regulations
    - Annual (or more frequent) reviews of legal requirements should be conducted
- The creation of a legal register, which should include:
    - A List of applicable regulations
    - Applicable requirements as dictated by the relevant regulation(s)
    - Procedures to ensure compliance with all legal requirements (i.e. employee training, product testing, etc.)

Example Legal Register

Ref	Aspect	Legislation/Enforcement	Key Requirements	Relevance/Controls	Compliance
H1	Occupational Exposure	GBZ 2.1: 2007 Occupational Exposure Limits for Hazardous Agents in the Workplace: Chemical Hazardous Agents Enforced by Ministry of Health	Provides concentrations of chemicals that is permitted in the workplace. Provides standard methods for monitoring.	Factory must assure that workers are not exposed to concentrations of chemicals that exceed these limits.	Workplace sampling for chemical exposures

If you have difficulty finding the appropriate regulatory resources, consultation services from local government bureaus or third party service providers may be available.

Regulatory Compliance Resources

When looking for resources or support with regulatory compliance, it may be helpful to engage with industry groups and/or third party consultants. By doing this regularly, you can better ensure that your

company is up-to-date on both national and international regulatory compliance requirements. Industry groups and organizations that provide these types of resources include, but are not limited to:

 American Apparel and Footwear Association – AAFA

 AFIRM Group – AAFA

 Footwear Distributors and Retailers of America – FDRA

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3.3. Continuous Improvement

Management systems are designed to drive continuous improvement. To achieve this, a system should be in place for the setting of objectives and targets to improve chemical and environmental management, as well as a system with which to regularly (i.e. annually) evaluate all polices, procedures, and goals for improvement. The figure below contains several good and bad improvement targets:

Good Targets	Poor Targets
• Decreasing the volume solvent based chemicals consumed by 15% per unit of production from 2016 to 2018. • Increasing the percentage of chemicals sourced and consumed from positive chemistry lists (i.e. bluesign). • A 10% reduction in hazardous waste volume per unit of production from 2016 to 2017.	• Provide Chemical safety training to all relevant workers • Ensure that all chemicals are labelled and stored properly • Obtain SDS for each chemical on-site *Note: These items are typically basic requirements in local law. Therefore, they would not be considered appropriate targets for continuous improvement.*

Click to Enlarge

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Chemicals Management – Level 2: Questions 14, 15, 23

It is important that objectives and targets focus on continual improvement rather than be limited to basic compliance with legal requirements.

3.4. Training

Effective training programs ensure that all levels of staff, from top-level management to production line employees, understand the potential hazards, risks, and controls associated with chemicals in the workplace. Various levels and types of training are required within an organization, and it is important that the training needs of all members of your organization are understood and met. A basic chemicals management training program should include the following:

- The company's chemical management policies and procedures
- The types of chemicals used in the facility, as well as their hazardous properties
- An overview of the manners in which workers or the environment may be impacted by the use or disposal of the types chemicals present at the facility
- How to read and use the information contained in Safety Data sheet (SDS)
- Procedures for the safe handling, use, and disposal of hazardous materials
- Any additional requirements under applicable laws and regulations

> ✻ An effective method of identifying your company's training needs is to map out the flow of chemicals from purchasing to disposal, identify which staff members are involved in each step, and determine the knowledge and type of training that is required to safely manage chemicals.

Training Tips

- Ensure the staff responsible for training employees have the technical knowledge and training skills necessary to deliver effective training.
- Use examples and pictures from your workplace to help employees understand how chemicals are managed in your facility.
- Use practical activities to engage workers and reinforce learning objectives.
- Conduct attendee feedback surveys to obtain information on areas or topics where workers may require additional education or more in-depth explanations.

Training Resources

Downloadable training materials and activities are provided at the end of each section of this Guide, and may be used to support your internal training programs. Quick links to each section's training materials are provided below for easy reference:

3.5. Downloadable Training Materials – Chemical Management Systems

Powerpoint Slides

Introduction to Management Systems

4. Chemical Purchasing & Selection

Proper management and oversight of a facility's chemical inputs is the most effective method of ensuring that hazardous chemicals are properly sourced and responsibly managed responsibly throughout their life cycle within your facility. A well-established chemical purchasing and selection program will help to ensure the following:

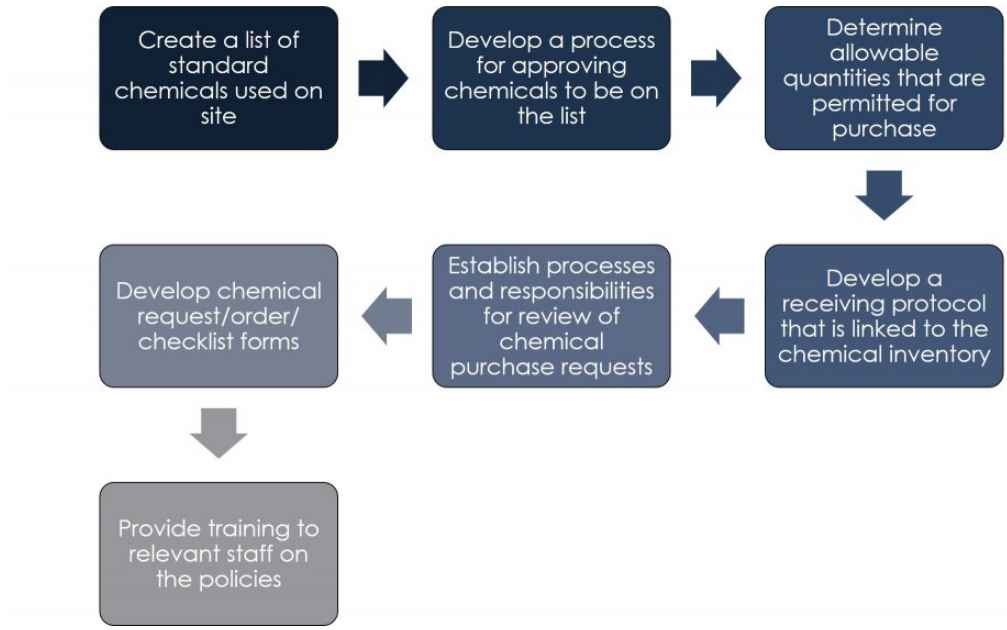
- That your facility remains compliant with all legal and other requirements associated with the use of hazardous chemicals.
- The the necessary procedures and responsibilities associated with the purchase of chemicals are clearly defined.
- That priority is given to the use of safer chemical alternatives.
- That all hazards associated with chemicals have been identified and properly evaluated prior to chemicals being brought on-site.
- That proper controls and safe working procedures are in place to reduce the risk of negative impacts to the health and safety of workers and to the surrounding environment.

4.1. Chemical Purchasing Policy

A documented chemical purchasing policy and procedure provides a standardized process for screening and collecting the required information on chemicals prior to their purchase and subsequent use on-site. When establishing a chemical purchasing policy and procedure, consider the information and steps below to ensure your purchasing program covers all the required areas.

Objectives of a Chemical Purchasing Policy

- Define roles and responsibilities for approving chemical purchases
- Define the types and quantities of chemicals that are approved for purchase and use at the facility
- Promote the use of less hazardous chemical alternatives
- Track all chemicals purchased and used on-site



Assigning Responsibilities

The role and responsibilities of the chemical purchasing manager/supervisor should be clearly defined in your purchasing program to ensure proper oversight of any chemicals that are purchased and subsequently brought on-site. The chemical purchasing manager/supervisor and all other responsible staff should have the technical skills, education, and experience necessary to understand all legal and other requirements as outlined in the program.

Approved Chemical Suppliers

An important part of any chemicals purchasing program is ensuring chemicals are purchased from suppliers that are committed to responsible chemicals management practices (such as consistent quality of formulation and stewardship of manufacturing). A good practice is to Identify and create a list of approved chemical suppliers that can demonstrate through documented evidence (i.e. internal quality control procedures, certificates of analysis, provision of legally required documentation such as GHS compliant SDS, etc.) that have they have procedures in place and a commitment to ensuring chemicals are manufactured in a responsible manner.

> Chemicals should always be purchased from approved chemical suppliers unless an exception is approved and documented by the Chemicals Management Manager (or equivalent).

When evaluating chemical suppliers, it is important to consider the following:

- Does the supplier have an internal quality management system (e.g. ISO 9001)?
- Does the supplier have a demonstrated environment management system (e.g. ISO 14001)?
- Is the supplier willing to provide ongoing certificates of analysis for each chemical purchase?
- Can the supplier provide MRSL compliance declarations with documented testing evidence?
- Does the supplier provide a GHS compliant SDS for each chemical?
- Does the emergency contact number on the supplied SDS direct you to the appropriate person/ department within the company?
- Is the supplier certified or approved by relevant third-party organizations (e.g. bluesign system partner)?

Approved Chemical List (Internal)

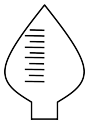
Another necessary element of a chemical purchasing program is to maintain an internal list of chemicals that have been pre-approved for regular purchase without additional review. This list should be up-to-date and referenced any time chemical purchasing requests are received. New or unapproved chemicals that are not on the approved chemical list must be reviewed and approved by the person(s) or department responsible for chemical purchasing.

> The approval status of chemical suppliers and individual chemicals is information that should be included in your Chemical Inventory

Safer Chemical Alternatives

A good chemical purchasing policy will promote the selection and use of safer chemical alternatives. Chemical Alternatives Assessments should be conducted regularly to ensure the potential risks of chemicals selected for use are well understood and that chemicals with the lowest potential risks to human health and the environment are prioritized for selection and use.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:


Chemicals Management – Level 2: Questions 16 & 22

Chemical Purchasing Resources


Chemical Purchasing Program – Good Practices:


Chemical Purchasing Program Checklist


Sustainability Coordinator Job Description


ZDHC Chemical Gateway

> ! It is important to note that **ALL** departments should be subject to your chemical purchasing policy and procedures, including maintenance, housekeeping, and other support staff not directly related to production.

4.2. Chemical Alternatives Assessment

A chemical alternatives assessment is a systematic method of evaluating chemicals currently in use or to be used, and determining whether safer chemical options exist whose use will reduce potential impacts to human health and the environment. A detailed example of an alternative assessment procedure has been created by BizNGO, and is accessible via the link below.


BizNGO Chemical Alternatives Assessment Protocol


Chemical Alternatives Assessment – Good Practices

Examples of Safer Chemical Alternatives

Process	Common Chemicals/Ingredients	Examples of Safer Alternatives
Glues / Adhesives	Acetone, 3-methylpentane, 2-methylpentane, n-hexane, cyclohexane, ethyl acetate and methyl ethyl ketone (MEK)	Water based adhesives, Safer solvent alternatives
Glue diluents	Acetone, ethyl acetate, dichloromethane and methyl ethyl ketone	Safer solvent alternatives
Printing Inks	N-hexane, cyclohexane, cyclohexanone, ethyl acetate and methyl ethyl ketone (MEK)	Solvent free inks, Diethylene glycol series ethers; Propylene glycol series ethers (ink removal)
Degreasing and cleaning	cyclohexanone, naphtha, dichloromethane	Cleaning Detergent, Water, Vegetable and plant-based cleaners, Safer solvent alternatives

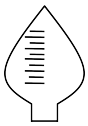
Considerations

When conducting your alternatives assessment, it is important to identify and evaluate all potential hazards of alternative chemicals to ensure that:

- The overall negative impacts of the alternative are quantifiably reduced (i.e. worker exposure, waste generation, etc.)
- Any remaining risks are managed appropriately.

> ✻ An example of this would be a substitution of a solvent-based screen printing ink or adhesive to a water-based alternative. Although water-based screen printing inks or adhesives are generally safer than their solvent-based alternatives, given that they are less of a fire hazard and do not exposure employees to organic solvents, they are not entirely hazard-free. Water-based inks and adhesives often contain additives or curing agents that can present a different category of hazards (i.e. skin and/or respiratory system irritants) that must also be considered and managed appropriately.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:


Chemicals Management – Level 2: Questions 17, 19, 20


Clean Production Action Green Screen®


chemsec SIN list


US Environmental Protection Agency DfE guidance


US Occupational Safety and Health Administration – Transitioning to Safer Chemicals


Washington State Department of Ecology – The Quick Chemical Assessment Tool


SUBSSPORT – Substitution support Portal

4.3. Chemical Lists (Positive Chemistry, RSL & MRSL)

There are currently several different chemical lists that have been created to support the use of safer (positive) chemical alternatives, restrict the use of certain chemicals in the manufacturing process, and/or control the amount of chemicals that can be present in finished products or materials. As part of your chemical purchasing and selection program it is important to understand the purpose, function, and applicability of these chemical lists. Where applicable, policies and procedures to comply with these lists should be included in your chemical management program.

Any questions regarding obtaining or the applicability of these lists to your company should be discussed with your customers (i.e. brands)

Positive Chemistry List

This list contains substances which have been assessed for their human & environmental health attributes, safety, environmental impacts and performance properties. These chemicals are recognized as available safer chemistries and are recommended for use. An example of a positive chemistry list would be the bluesign® bluefinder list of chemicals.

Manufacturing Restricted Substances List (MRSL)

This list focuses on substances used in the production process or in the manufacturing facility. It lists chemicals that are restricted from being used in the manufacturing of products. To test against an MRSL, chemicals need to be tested before they are used on-site.

Customers may have their own MRSL or follow an established industry MRSL such as chemicals with usage bans as listed in the bluesign® system substance list (BSSL) or the Zero Discharge of Hazardous Chemicals (ZDHC) MRSL.


bluesign® system substance list – BSSL


Zero Discharge of Hazardous Chemicals (ZDHC) MRSL

Restricted Substances List (RSL)

This list focuses on substances that can be present in finished materials and products. RSLs determine acceptable amounts of substances that can be present in finished materials or products. To test against an RSL, finished materials and products are tested.

Customers may utilize their own RSL, or adopt an industry-established RSL such as the bluesign® system substance list (BSSL).

bluesign® system substance list – BSSL

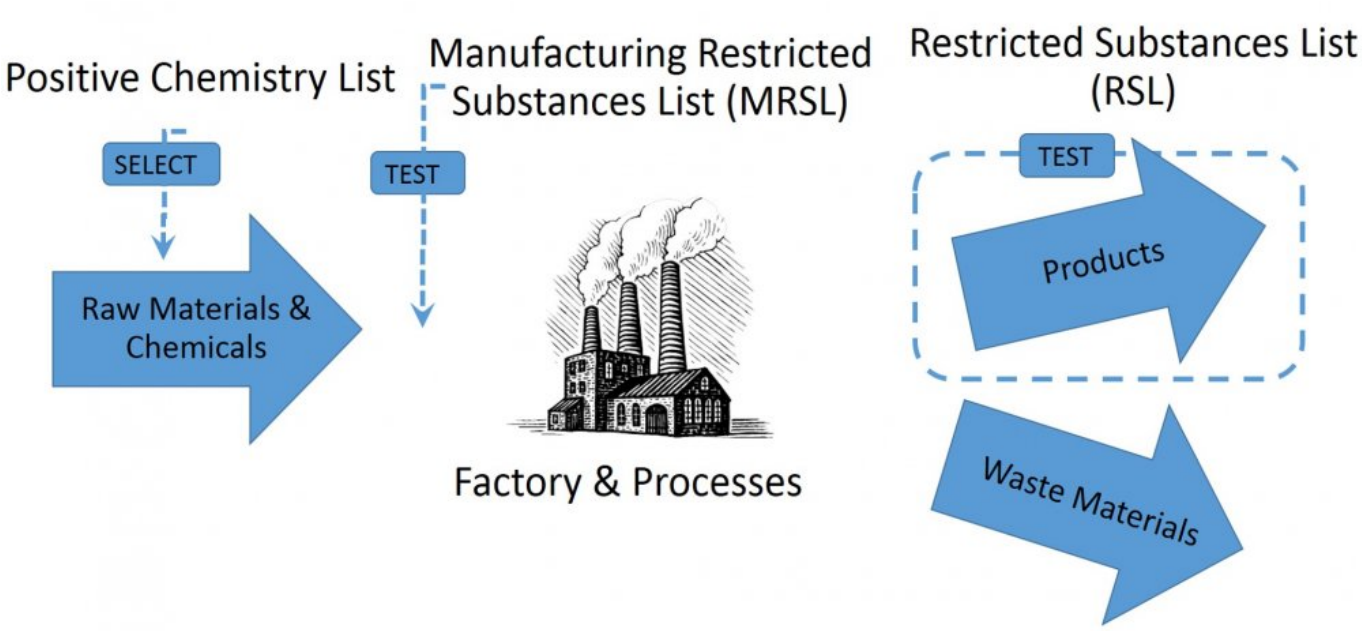
The AFRIM Group, an industry collaboration, also publishes a publicly available RSL and RSL toolkit that may provide helpful guidance toward understanding and managing RSL requirements.

AFRIM RSL

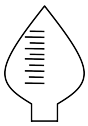
AFIRM RSL Toolkit

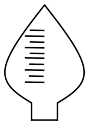
Chemistry Lists Flow Diagram

The figure below provides a visual summary of the use of chemical lists and where applicable screening and testing programs may be required.



Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:


Chemicals Management – Level 1: Questions 7, 10, 11, 12


Chemicals Management – Level 2: Question 21

4.4. Development and Maintenance of a Chemical Inventory

A Chemical Inventory List (CIL) is an important component of your chemicals management program. A CIL serves as a database of all chemicals present or used at your facility. A well-established CIL will:

- identify and prioritize hazardous chemical for substitution (i.e. restricted chemicals, significant human/environmental health impacts)
- track chemical usage quantities (can be used in the development and tracking of targets)
- identify which process(es) and location(s) chemicals are used
- identify any unknown or unclassified chemicals on-site and regulate purchasing approvals
- serves as a list of chemicals approved for purchase
- standardize purchasing schedules and quantities
- reduce overstocking or expiration
- identify any redundant chemistries or areas of excessive use
- assist in deciding where to locate emergency response, containment, and first-aid equipment

Building Your Chemical Inventory

- In order to ensure your inventory includes **ALL** chemicals that are present and/or in use at your facility, conduct a review of all production and support processes (i.e. maintenance, cleaning, power generation, etc.) Any newly purchased chemicals should be included in the CIL as well.
- Obtain and review chemical information of each chemical (i.e. Safety Data Sheets (SDS), RSL/MRSL testing reports).
- Create a standardized inventory of all chemicals used and include relevant information on inventory.

What Information Needs to be included in the CIL?

There are several standard pieces of information that should be included in a CIL (as noted below), however additional information can be added based on how your company intends to use its CIL. Remember, a CIL is a useful database that can serve many functions, and should serve as a cross-departmental chemicals management tool.

Basic Information to include on your CIL

- Chemical/Product name or code
- Supplier (name, location, contact person)
- Chemical ingredients (name, CAS #, and percent (%) content)
- Hazard classifications (i.e. flammable, corrosive)

- Process, storage and, use location
- Amount stored on-site
- Usage quantity (i.e. monthly, annually)
- Availability of Globally Harmonized System (GHS) compliant SDS and/or associated SDS number
- Revision date

Revision Date: 01/21/2017

Example Chemical Inventory List

#	Storage/Use Location	Process	Chemical Name	Supplier/Contact	On Approved Chemicals Lists?	Chemicals	CAS #	% Composition	SDS #	Hazard Class	Quantity Stored	Annual Consumption to date
1	Dye Kitchen - Production Storage A	Fabric Dying	Acetic Acid	ABC Chemicals tel. (555)9393-2020	Yes	Acetic Acid	64-19-7	99.99%	SDS-01	**Flammable** - category 3, **Corrosive** - Serious eye damage, category 1, Skin corrosion, category 1A	250L	1500L
2	Dry Chemical Storage	Fabric Dying	LFS-200	Chemstar tel. (555)2020-9393	Yes	Silica	7631-86-9	35%	SDS-02	**Environmental Hazard** - Acute hazards to the aquatic environment, category 1	20kg	600kg
						Aluminum	7429-90-5	65%				

Available tools to help brands and manufacturers manage & analyze CIL data include **SciVera Lens Rapid Screen**, **3E Protect**, and others.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Chemicals Management – Level 1: Questions 1, 1b, 1c, 13

Chemicals Management – Level 2: Question 18

Chemical Inventory Resources

Sample CIL Template

4.5. Downloadable Training Materials – Chemical Purchasing & Selection

Powerpoint Slides

 Chemical Purchasing

 Chemical Lists – Positive Chemistry, MRSL & RSL

 Chemical Inventory

Activities

 Chemical Purchasing Program Activity

5. Hazard Communication

Hazard communication is based on the foundation that employees have the “Right to Know” and understand the hazards properties of the chemicals with which they are required to work or that are present in the workplace. An appropriate hazard communication program will ensure the necessary information is readily available and is clearly and consistently communicated within your company.

An effective hazard communications program will include documentation and procedures addressing the following:

- A Chemical Inventory
- Alignment with the Globally Harmonized System – GHS
- Safety Data Sheets – SDS
- Standardized Chemical Labeling
- An Employee Training Program

✻ Everyone who works with or is potentially exposed to hazardous chemicals should receive hazard communication training **before** starting work.

Hazard Communication Resources


Hazard Communication Policy Sample


U.S. Occupational Safety and Health Administration (OSHA) Hazcom website

! *Note that regulatory references in these documents are country specific and may not apply to your facility.*

5.1. Globally Harmonized System (GHS)

The Globally Harmonized System for Classification and Labeling of Chemicals (GHS) is an internationally agreed-upon system for the classification and labeling of chemicals. The GHS was developed by the United Nations to replace individual sets of classification and labeling standards used in different countries with a single, standardized set of criteria for the classification and labeling of chemicals on a global scale.

GHS requirements outline standardized requirements for the following:

1. Classification of chemical substances and mixtures based on their physical, health, and environmental hazards.
2. Hazard communication principles, including Labeling Requirements and the content and format of Safety Data Sheets – SDS.

GHS pictograms represent the following hazards:

Exploding Bomb: Explosives, Self Reactives, Organic Peroxides

Gas Cylinder: Gases Under Pressure

Flame: Flammables, Self Reactives, Pyrophorics, Self-Heating, Emits Flammable Gas, Organic Peroxides

Flame Over Circle: Oxidizers

Corrosion: Skin Corrosion/Burns, Eye Damage, Corrosive to Metals

Health Hazard: Carcinogen, Mutagenicity, Reproductive Toxicity, Respiratory Sensitizer, Target Organ Toxicity, Aspiration Toxicity

Exclamation Mark: Irritant (eye & skin), Skin Sensitizer, Acute Toxicity, Narcotic Effects, Respiratory Tract Irritant, Hazardous to Ozone Layer (non-mandatory)

Skull & Crossbones: Acute Toxicity (fatal or toxic)

Environment: Aquatic Toxicity

 UN GHS Website

You may use the link below to search the UN GHS implementation webpage for information on the status of GHS implementation and applicable regulations in your country.

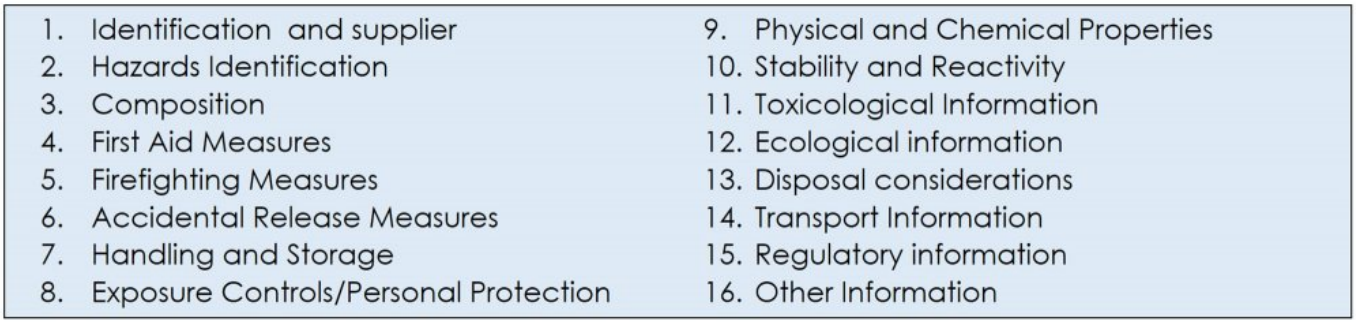
UN GHS Implementation Webpage

5.2. Safety Data Sheets (SDS)

Safety Data Sheets (SDS) [formerly known as Material Safety Data Sheets (MSDS)] are informative documents intended to provide employees and emergency personnel with proper procedures for the safe handling, storage, and disposal of hazardous substances.

The GHS provides standardized requirements for the information to be contained in an SDS.

The required sections in a complete SDS are outlined in the figure below:



Click Image to Enlarge

U.S. OSHA Quick Card – SDS Sections & Content

Resources

Example of a Good SDS

Example of a Bad SDS

AFIRM RSL Toolkit Appendix G of the toolkit provides additional SDS guidance/examples and can be downloaded in multiple languages.

 ISO 11014:2009 Preview Safety data sheet for chemical products — Content and order of sections

5.2.1. SDS Management

Obtaining Safety Data Sheets (SDS)

A GHS compliant SDS and all other relevant information should be obtained from your chemical supplier prior to the purchase of any chemicals. If a non-compliant SDS is received, the chemical supplier should be notified immediately and required to provide the necessary documentation. Every SDS should be reviewed by properly trained staff to ensure that they contain all the information required. A GHS compliant SDS should be maintained for every chemical in use at your facility.

The following documents summarize the required sections and information for SDS, and can be provided to chemical suppliers if needed :

 Descriptions of SDS Sections and Content

 Annex 4 of the GHS (Rev.6) (2015)

Maintaining SDS Documentation

Proper internal SDS management procedures will ensure that appropriate and up-to-date chemical information is available at your facility. The following good practices should be exercised as part of your SDS documentation management program:

- Keep designated staff in charge of managing and updating SDS documentation
    - i.e. filing hard and/or soft copies, distributing SDS to relevant departments
- Ensure that employees operating in procurement and the receiving areas where SDS are likely to enter the facility understand how to properly process newly-received SDS
- When a new SDS is received, there should be procedures in place to compare it to the previous versions, make notes/records of any changes and update related training information
- Procedures should be in place to archive old SDS versions and to maintain SDS for chemicals that are no longer in use

 It is considered a good practice to request updated versions of SDS every 3 to 5 years (or more regularly, if required by local law). SDS should also be updated any time a change in chemical composition has occurred.

Where to keep your SDS

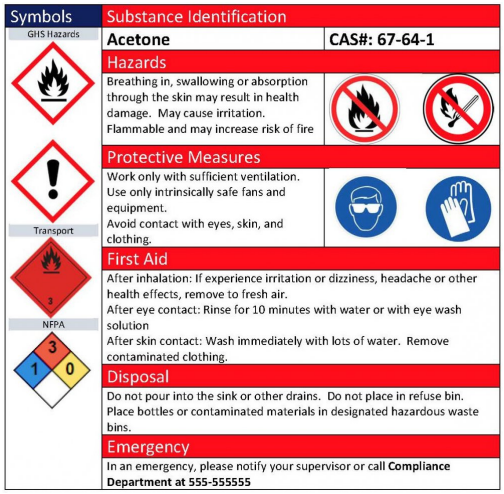
SDS for all chemicals stored and used on-site must be readily available to all workers. This can be accomplished in several ways. An example of a good practice is to post SDS or maintain them in a binder in each work area. When choosing where to keep your SDS, consideration should be given to providing quick and easy access to this information should it be required. Another good practice is to maintain a centralized SDS library where copies of all SDS are maintained.

> ! SDS Information should be available in the local language of workers at the facility. If the chemical supplier cannot provide this, a qualified translation service provider should be used.

Simplified SDS

Complete chemical SDS contain highly detailed information that may be difficult for most employees to understand. Another good practice is to create simplified information sheets for chemicals that present information in an easy to understand manner. These should be written in the local language(s) of the workers, be posted wherever chemicals are stored or used, and provide simplified information regarding:

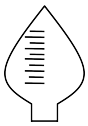
- The chemical hazards
- Controls (i.e. safety working practices and PPE)
- Appropriate emergency response (i.e. first aid and spills response)



Simplified SDS (Click Image to Enlarge)

! Simplified SDS are not a substitute for full (GHS compliant) SDS. If simplified SDS are used, complete SDS should be maintained in a dedicated location and be available to employees.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:



Chemicals Management – Level 1: Question 2

SDS Resources

U.S. OSHA Brief on Safety Data Sheets

UK REACH Leaflet – Safety Data Sheets

Scivera Lens Rapid Screen

3E Company SDS Solutions

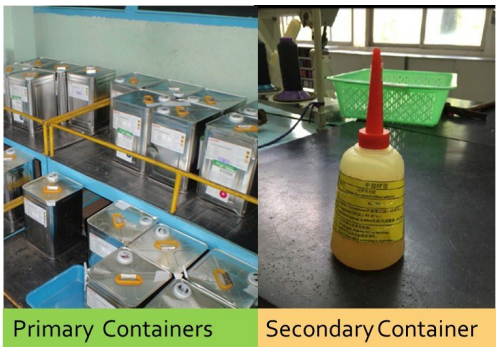
International Labour Organization: Chemical Safety Cards

Chemical Safety Cards: Chinese

! *Note that regulatory references in these documents are country specific and may not apply to your facility.*

5.3. Chemical Labeling

Chemical Labeling is an important component of an effective Hazard Communication Program. Clear and consistent labeling throughout your facility will ensure that chemical hazards are easily distinguishable and understood by employees. There are generally two types of chemical containers that are present in manufacturing facilities:



- **Primary Containers** – Containers in which bulk chemicals are typically received and contain larger volumes of chemicals (i.e. chemical drums)
- **Secondary or Workplace Containers** – Containers into which bulk chemicals are transferred from primary containers for use in production or chemical application areas.

Primary Container Labeling

Primary container labels are required to be placed on bulk chemical containers and packing provided by chemical suppliers. These labels should meet requirements for both GHS transport and hazard labeling. Examples of GHS labeling requirements and arrangements for primary containers and packaging can be found in Annex 7 of the GHS (Rev.6) (2015)

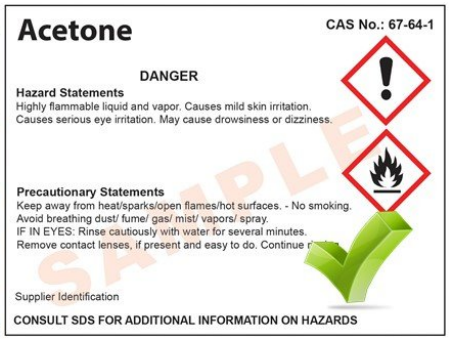
Annex 7 of the GHS (Rev.6) (2015)

A summary of the GHS hazard label requirements is provided below:

1. **Product Identifier** – Name of the product
2. **Pictograms** – Graphic giving information about the potential hazard(s) of the product
3. **Signal Word** – Descriptive word/statement that explains the potential hazard of the product. Examples “Danger” or “Warning”
4. **Hazard Statements** – Explanation of the product’s potential hazard
5. **Precautionary Statements** – Statement(s) that convey information on how to prevent or minimize the negative effects of coming in contact with the product. Precautionary statements fall into 4 categories: prevention, response, storage and disposal.
6. **Supplier Information** – Contact information for the manufacturer/supplier of the product including company name, address and telephone number

Staff responsible for receiving chemicals should ensure that appropriate labels are present on all containers. Also, a quick check can be conducted using the supplied SDS for the chemical to ensure that the label and SDS information is consistent and correct. Any inconsistencies should be investigated prior to using the chemical.

Workplace Container Labeling



In production work areas, chemicals are often required to be transferred from their primary containers into secondary or workplace containers for ease of use. Workplace containers are often smaller and can consist of various shapes that may restrict the amount of information a label can contain. At minimum, workplace container labels should display the following information:

- The identity of the chemical (chemical name)
- The associated hazards (signal word and/or hazard statement)
- Pictogram

The below example summarizes the minimum recommended label elements for workplace containers.

LABEL ELEMENT	EXAMPLES
SIGNAL WORDS – Provide an immediate warning to the reader	Danger or Warning
HAZARD STATEMENTS – Describe the nature and severity of the chemical hazard based on a chemical's classification	Causes severe skin burns and eye damage Flammable liquid and vapor May cause respiratory irritation May cause cancer Fatal if inhaled
PICTOGRAMS – Provide a pictorial representation of the type of hazard that can be easily recognised at a glance	
Adapted From: http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/managing-risks-of-hazardous-chemicals-in-the-workplace	

Click Image to Enlarge

To help ensure clear and consistent labeling of workplace containers, facilities should make standardized labels available in all areas where chemicals are transferred to secondary containers.

Labeling Resources

GHS Pictograms – Downloadable Image files that may be used to make your own workplace labels

U.S. OSHA Brief on Labels and Pictograms

Note that regulatory references in this document are country specific and may not apply to your facility.

5.4. Employee Training

Hazard communication training ensures that employees understand the potential hazards they may be exposed to in the workplace, as well as how they can protect themselves and others. All employees and subcontractors responsible for managing, storing, handling, using and/or disposing of chemicals must receive appropriate hazard communication training **before** they begin work, as well as any time new hazards are introduced into the workplace.

The level of training should be tailored for employees based on their position, however a basic hazard communications training program should include the following:

- The types of chemicals used in the facility and their associated hazards
- How employees may be exposed to chemicals during their storage, use and disposal
- Explanation of the information contained on SDS and chemical labels in the workplace as well as when these should be consulted
- Where and how to access SDS information
- The protective measures in place to prevent harmful exposures to chemicals and who to contact in the event of an emergency
- Any additional requirements under applicable laws and regulations

Chemical information can often be highly technical and difficult for employees to understand. This should be considered when developing a hazard communication training program. Companies should strive to ensure that training is conducted in a manner and language that employees can understand.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Chemicals Management – Level 1: Question 3

Hazard Communication Training Resources

Useful hazard communication training materials can be found here: Sample Hazard Communication Training Material

5.5. Downloadable Training Materials – Hazard Communications

Powerpoint Slides

 Hazard Communications

 Introduction to Chemical Hazards

Activities

 GHS Symbols Quiz

6. Chemical Storage & Transfer

Once chemicals are brought on-site, the appropriate storage and handling of chemicals will help to further reduce remaining risks to workers and the environment. The following sections provide examples of good storage practices and tools to assist with the safe Storage and Transfer of hazardous chemicals.

6.1. Chemical Storage

The proper storage of chemicals is another important element of an effective chemicals management program. This is because:

- Some chemicals are inherently unstable or highly reactive, or may become unstable under certain conditions
- Some chemicals present a fire or explosion hazard if not stored properly
- Spills or leaks of chemicals can have a detrimental impact on worker health and the environment.

Risks to the health and safety of workers, other persons, and to the environment posed by the storage of hazardous material can eliminated or reduced by using the following good storage practices:

Safety Features of Bulk & Production Chemical Storage Areas

- Area is secured and sufficiently covered
- Containers are stored on impervious surfaces (i.e. epoxy treated surfaces)
- Secondary containment units are in place. Note: Secondary containment should be at least 110% of the volume of the largest container stored and/or greater than 10% of the total volume of the stored substance(s)
- Area is well ventilated
- Accessible safety shower/eye wash nearby (within 30 meters)
- Restriction on drinking, eating, and smoking
- Spill kits with materials for containment and absorption
- Fire-fighting equipment, fire hoses, and/or fire extinguishers
- Signs indicating the PPE required to be worn when working in the area should be posted in visible location(s)
- Aisles and forklift routes are clearly marked (if applicable)
- Incompatible materials are segregated
- Flammable and combustible materials are stored away from ignition or heat sources
- Chemical containers should not be stacked higher than three (3) meters (10 feet).

Chemical drums should always be stacked with the closure device upward. Drums should be stacked fewer than four (4) drums high, preferably with pallets between layers. Side-mounted drums should be secured or chocked to prevent them from rolling

Regular review and inspection of chemical storage areas will help ensure that chemicals are stored safety and the appropriate controls are in place. A checklist is provided in the resources section below.

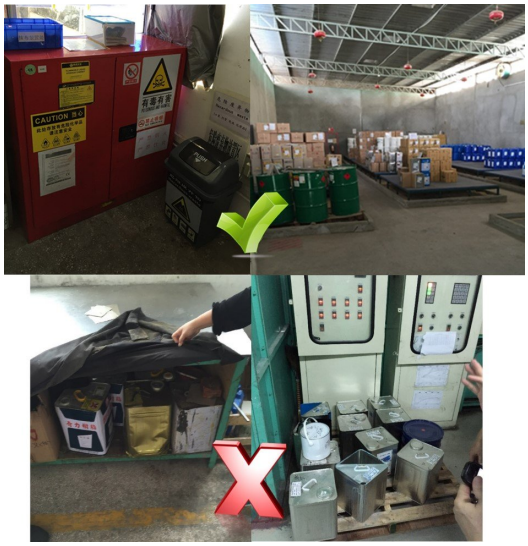
American National Standard for Emergency Eyewash and Shower Equipment

Storage of Flammables

Although regulatory and other definitions may vary, flammable liquids are generally defined as any liquid having a flashpoint below 37.8 degrees Celsius. This information can be found on the SDS. Common flammables include:

- Glues & Adhesives
- Primers
- Thinners
- Solvent based inks
- Cleaning solvents

The amount of flammable chemicals stored on-site in bulk or production storage areas should be limited as much as possible. Flammables storage areas should have the following protections:



- Dedicated storage buildings, areas, or cabinets
- Separated from flammable materials, potential ignition sources, etc.
- Ventilation to eliminate the build up of flammable gases
- Intrinsically safe electrical installations and lighting
- Secondary containment
- Fire suppression equipment
- Smoke detection/fire alarm systems
- Warning signage

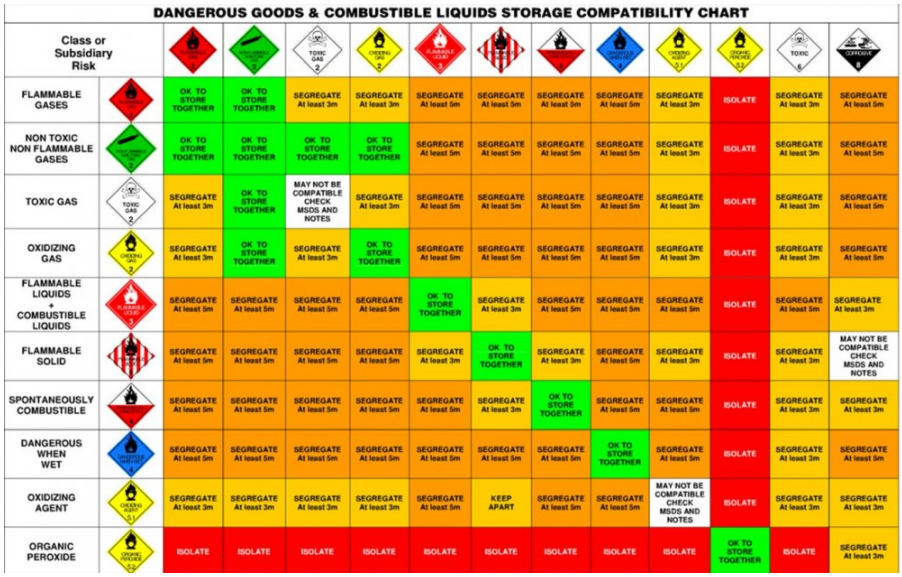
NFPA 30 Flammable and Combustible Liquids Code

The above NFPA Code (and all other NFPA Codes and Standards) can be accessed free of charge by creating a free online account on the National Fire Protection Association NFPA Website

Chemical Compatibility

In some cases, different classes or groups of chemicals, if mixed together, may create increased risks for fire, explosion, formation of toxic environments, etc. Certain classes or groups of chemicals must therefore be protected, stored separately, or kept at a safe distance from other chemicals.

Chemical compatibility information can be found on the chemical's SDS, and should always be reviewed before the chemical is stored with other chemical types. The chemical compatibility chart below provides general guidance on storage comparability for chemical groups.



DANGEROUS GOODS & COMBUSTIBLE LIQUIDS STORAGE COMPATIBILITY CHART

Class or Subsidiary Risk	FLAMMABLE GASES	NON TOXIC NON FLAMMABLE GASES	TOXIC GAS	OXIDIZING GAS	FLAMMABLE LIQUIDS + COMBUSTIBLE LIQUIDS	FLAMMABLE SOLID	SPONTANEOUSLY COMBUSTIBLE	DANGEROUS WHEN WET	OXIDIZING AGENT	ORGANIC PEROXIDE
FLAMMABLE GASES	OK TO STORE TOGETHER	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 5m
NON TOXIC NON FLAMMABLE GASES	OK TO STORE TOGETHER	OK TO STORE TOGETHER	OK TO STORE TOGETHER	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 5m
TOXIC GAS	SEGREGATE At least 3m	OK TO STORE TOGETHER	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 5m
OXIDIZING GAS	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 5m
FLAMMABLE LIQUIDS + COMBUSTIBLE LIQUIDS	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 5m	SEGREGATE At least 3m
FLAMMABLE SOLID	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 3m	ISOLATE	SEGREGATE At least 3m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES
SPONTANEOUSLY COMBUSTIBLE	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
DANGEROUS WHEN WET	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	OK TO STORE TOGETHER	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 5m
OXIDIZING AGENT	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 5m	KEEP APART	SEGREGATE At least 5m	SEGREGATE At least 5m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
ORGANIC PEROXIDE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	OK TO STORE TOGETHER	ISOLATE	SEGREGATE At least 3m

Chemical Compatibility Chart (Click to Enlarge)

A Chemical Reactivity Worksheet (CRW) program containing a detailed chemical reactivity database for common hazardous chemicals can be downloaded from the National Oceanic Atmospheric Administration (NOAA) website below:

Chemical Reactivity Worksheet

p(banner important). *Note: This program needs to be downloaded and installed on your PC.*

Additionally, certain chemicals may react negatively to different storage materials (i.e. containers or shelves/racking). It is therefore important to ensure that containers, shelving/racking, and storage room building materials are compatible with the chemicals being stored. This information can also be obtained from the SDS.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

There should not be any chemical reaction between chemicals and shelves or chemicals and containers
i.e. Acids and Metals

Product Name: ExxonMobil(TM) MEK
Revision Date: 29 Sep 2011
Page 6 of 13

Suitable Materials and Coatings (Chemical Compatibility): Carbon Steel; Stainless Steel; Polyester; Teflon; Butyl Rubber
Unsuitable Materials and Coatings: Ethylene-proplyene-diene monomer (EPDM); Polyacrylonitrile; Polypropylene; Polystyrene; Polyvinyl Alcohol; PVC; Polyethylene; Natural Rubber

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

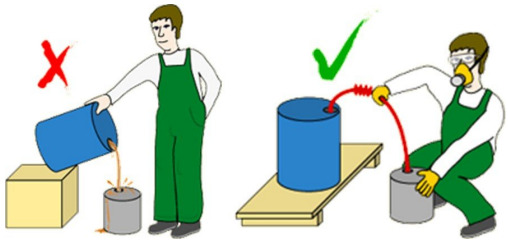
Chemicals Management – Level 1: Questions 6 & 9

Chemical Storage Resources:

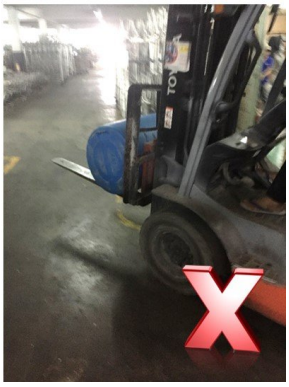
Chemical Storage – Good Practices

Chemical Storage Area Checklist

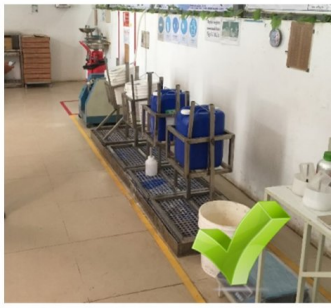
6.2. Chemical Transfer



The transfer of hazardous chemicals poses an increased risk to workers and the environment as the chemicals are unconfined while being poured or pumped from one container to another. Proper transfer tools and procedures will reduce the potential for spills, which can result in negative impacts to workers' health or the environment. These tools and procedures can also result in cost savings by reducing chemical loss.



Unsecured Drum Transport



Secured Drum Cart & Pouring Rack with Drip Tray

Grounding & Bonding of Flammable Chemicals

Grounding and bonding is used to help control the risks associated with static electricity. When transferring liquid chemicals from one container to another, the movement of chemicals via the transfer tools may generate a static electricity charge. This can create a difference in the electrical charge between the two containers. If this static electricity charge is released, it can create a spark. If the chemicals being transferred have a low flash point, meaning they are highly flammable, this can result in a fire or explosion.

When transferring Category 1, 2, or 3 flammable chemicals with a flash point below 37.8 °C, The pouring and receiving containers should be bonded (connected with a wire and clamp assembly) to equalize the

electrical charge between both containers. These bonded containers should then be grounded (connected to a grounded or earthed wire) to allow any build-up of static electricity to be release to the ground. An example of bonded an grounded containers is illustrated in the figure below:

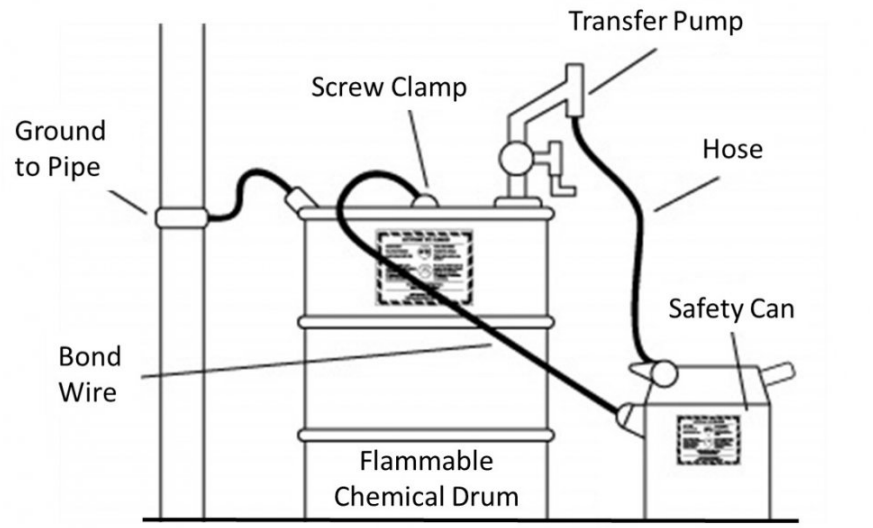


Image adapted from https://www.ccohs.ca/oshanswers/prevention/flammable_static.html

✻ The flammability category and flash point of a chemical can be obtained from the SDS. The SDS may also contain additional information and/or recommendations for the use of bonding and grounding.

! Bonding and grounding may be required in both indoor and outdoor environments as good ventilation does not remove the risk of static electricity being built up or discharged.

Chemical Transfer Resources

Chemical Transfer – Good Practices

CCOHS Fact Sheet – Working Safely with Flammable Chemicals & Static Electricity

NFPA 30 – Flammable and Combustible Liquids Code

NFPA 77 – Recommended Practice on Static Electricity

The above NFPA documents (and all other NFPA Codes and Standards) can be accessed free of charge by creating a free online account on the National Fire Protection Association NFPA Website

6.3. Downloadable Training Materials – Chemical Storage & Transfer

Powerpoint Slides


Chemical Storage


Chemicals Transfer

Activities


Chemical Storage Activity

7. Chemical Exposure & Controls

Employees required to work with hazardous chemicals are potentially exposed to conditions that may cause adverse health impacts. Many commonly used chemicals can produce acute (short-term) and chronic (long-term) toxic and irritating effects, skin and/or respiratory system sensitization and irritation, and other occupational illnesses if not properly controlled.

Workers are most commonly exposed to chemicals through the following exposure routes:

- **Inhalation** of airborne vapors, mists, dusts, etc.
- **Absorption** through skin contact or other mucous membranes (i.e. eyes)
- **Ingestion** (i.e. eating/handling food or drink with contaminated hands or clothing)

It is the responsibility of every employer to ensure employee exposures to chemical hazards are maintained below local permissible exposure limits as defined by local law through the application of appropriate controls, such as engineering (e.g., ventilation, isolation), administrative controls (e.g., work practices) or personal protective equipment (PPE). View the sections below for more detailed information on:

- Occupational Exposure Limits
- Employee Exposure Assessments
- Controlling hazards using the Hierarchy of Controls
- Reducing exposures through:
  - Ventilation
  - Safe Use & Work Practices
  - The selection and use of PPE

7.1. Occupational Exposure Limits

Occupational Exposure Limits (OEL) or Permissible Exposure Limits (PEL) are defined as the maximum concentration of a substance to which a worker may be exposed to over a given period of time. Chemicals may have more than one OEL for different “averaging” or exposure times. Common types of exposure limits are explained below:

Time Weighted Average (TWA) – A TWA exposure limit is the limit for the average exposure over a specified period, typically 8 hours, which represents a standard work shift.

Short Term Exposure Limit (STEL) – A STEL exposure limit is the limit for the average exposure over a shorter period of time, typically 15 minutes. These limits often apply to substances that produce acute (or fast acting) effects on the human body. Many organic solvents have both STEL and TWA exposure limits.

Ceiling or Maximum Allowable Concentration (MAC) – A Ceiling or MAC exposure limit is concentration of the chemical that should not be exceeded for any period of time.

Where can I find applicable OELs?

Country-specific OELs are often defined within local regulations and should be referenced for legal compliance. Examples of some country-specific TWA and STEL for some common substances are provided below:

Note: The examples provided below were accurate at time of publication and may be updated from time to time. The most current regulations regarding country-specific OELs should always be referenced.

Contaminant	Permissible Exposure Limits (all values in mg/m³)					
	Cal-OSHA*		China**		Vietnam***	
	8-Hour TWA	STEL	PC-TWA	STEL	PC-TWA	STEL
Acetone (CAS# 67-64-1)	1200	1780	300	450	200	1000
Methyl ethyl ketone (MEK) (CAS# 78-93-3)	590	855	300	600	150	300
Cyclohexane (CAS# 110-82-7)	1050	-	250	-	500	1000
Ethyl Acetate (CAS# 141-78-6)	1400	-	200	300	-	-
Toluene (CAS# 108-88-3)	37	560	50	100	100	300
Xylene (CAS# 1330-20-7)	435	655	50	100	100	300

*California Occupational Health & Safety Administration, Table AC-1 (2015)
** GBZ 2.1-2007 Occupational exposure limits for hazardous agents in the workplace Chemical hazardous agents
*** No. 3733/2002/QD-BYT – Occupational exposure standards of Vietnam

TWA = Time Weighted Average
STEL = Short Term Exposure Limit
"-" Indicates no exposure limit has been established

✻ If you are having difficultly finding country-specific OEL regulations for your country, you should contact your local government's occupational health and safety bureau for assistance with obtaining a copy of the regulation(s) or the correct legal reference(s).

What if there is no OEL in my country's regulations?

Some countries may not have established OELs for all substances in use at your facility. In this case, it is recommended that accepted OELs from other jurisdictions or governmental bodies be adopted.

GESTIS International Occupational Exposure Limit Value Search

California OSHA Permissible Exposure Limits for Chemical Contaminants – Table AC1

American Conference of Governmental Industrial Hygienist – ACGIH The ACGIH is an Internationally recognized organization that publishes (for purchase) Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®).

! The lack of an OEL does not mean the substance is safe and workers can be exposed without being harmed. When no OEL is available, other methods for determining controls

may be applicable (e.g. control banding). It is recommended that a certified occupational hygiene professional should be consulted in these cases.

Other Considerations

Extended Work Shifts

As noted above, TWA exposure limits are based on an averaging time of 8 hours. If employees work longer than 8 hours, TWA exposure limits must be adjusted to account for extended exposure time and reduced recovery time.

Exposure to Multiple Chemicals

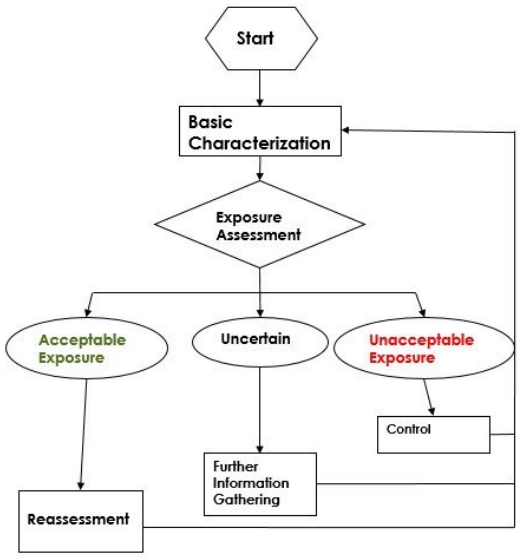
Workers are often exposed to multiple chemicals at the same time (i.e. chemicals mixtures). This can sometimes result in more severe impacts to a worker's health.

In these cases illustrated above, it is recommended that qualified occupational hygiene experts such as Certified Industrial Hygienists (CIH) be consulted for further evaluation of potential exposure risks.

7.2. Exposure Assessments

It is the responsibility every employer to ensure employee exposures to chemical hazards be maintained as low as possible, and at minimum, below Occupational Exposure Limits as defined by local law through the application of appropriate controls. In order to confirm whether exposures are exceeding these limits, it is necessary to measure or accurately estimate potential exposures. This is achieved by conducting a formal exposure assessment.

Adapted from AIHA *A Strategy for Assessing and Managing Occupational Exposures*



The main objectives of an exposure assessment is to determine:

1. The hazards to which employees are exposed (i.e. which chemicals)
2. The route(s) by which the employee may be exposed to these chemicals (i.e. inhalation, skin contact)
3. The amount of chemicals employees may be exposed to (either through measurement or professional judgement)
4. The types of controls that may be needed to protect the employee from harmful exposure

Although it is not possible to summarize a comprehensive exposure assessment strategy here, the following guidance is provided to answer general questions regarding the process for measuring the concentrations of airborne chemicals.

> To ensure that potential exposures are properly assessed, exposure assessments should be conducted in consultation with qualified occupational hygiene professionals such as a Certified Industrial Hygienist (CIH).

What to Sample For?

To determine which substances employees are potentially exposed to, you will need to review the SDS for each of the chemicals they use or that are used in their work areas. The chemical composition section of the SDS will tell you which chemicals may be present in the air. This also applies for dermal or skin exposure.

In the below example SDS, workers would potentially be exposed to methyl ethyl ketone and acetone.

3 . Composition/information on ingredients

Name	CAS number	%
Methyl Ethyl Ketone	78-93-3	30-60
Acetone	67-64-1	10-30

How to Sample?

The type of sampling and method to be used will be dependent on the type of chemical being measured. There is often more than one method for sampling, and local authorities may require specific methodologies be used for regulatory compliance. Common methods of sampling include the use of passive sampling badges or personal sampling vacuum pumps that draw air through a filter or sampling tube which collect the specific airborne contaminant. Samples are collected for varying times based on the objective of the sampling (i.e. TWA or STEL Exposure Limits) and should be collected in the breathing zone of the representative worker as shown below:

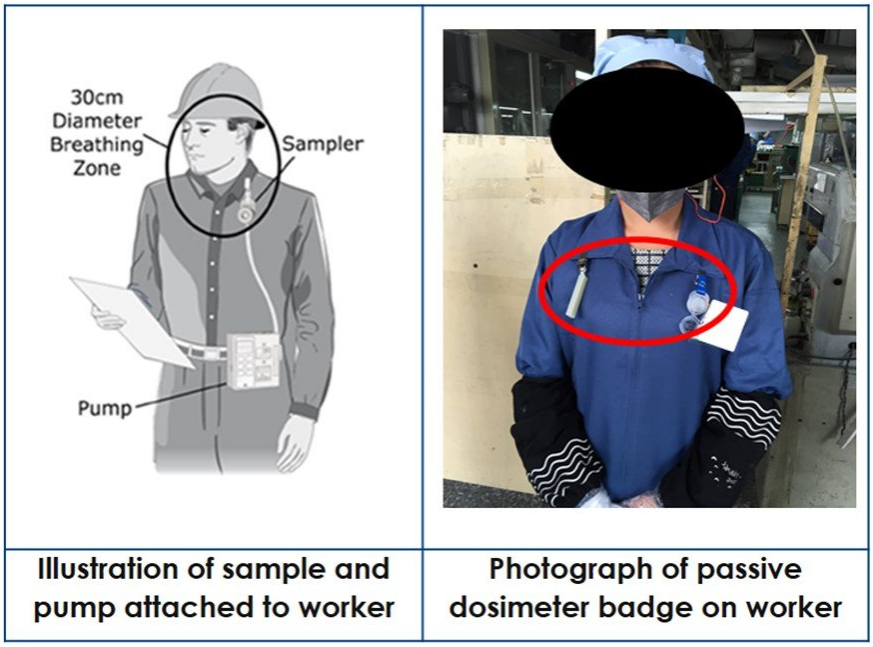


Illustration of sample and pump attached to worker

Photograph of passive dosimeter badge on worker

How Many Samples to Collect?

The number of measurements required to accurately determine whether workers are overexposed will depend upon several variables including:

- Number of workers exposed
- Type of exposure
- Statistical significance required

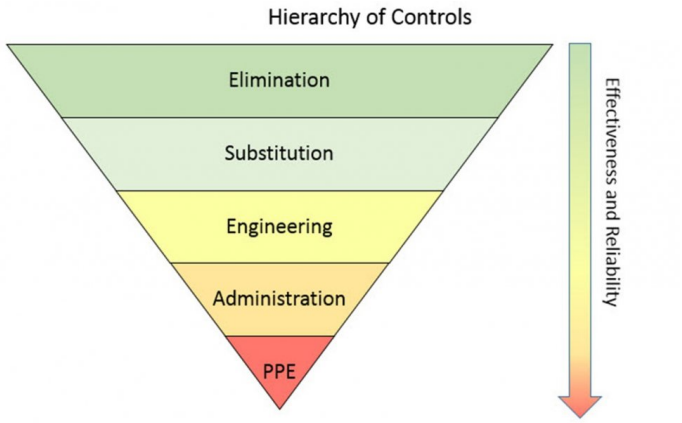
Some general guidelines include:

- Generally, a single sample is not sufficient to determine compliance with an exposure limit
- 1 in 10 similarly exposed workers (10%) with minimum of 3 and spread of results < 25% will provide reasonable approximation of exposure
- 6 to 10 samples of similarly exposed workers will provide a reasonable approximation of the exposure profile

In some cases, the local jurisdiction will have a specific requirement regarding number of samples to be collected. If not, a certified occupational hygiene professional should be consulted.

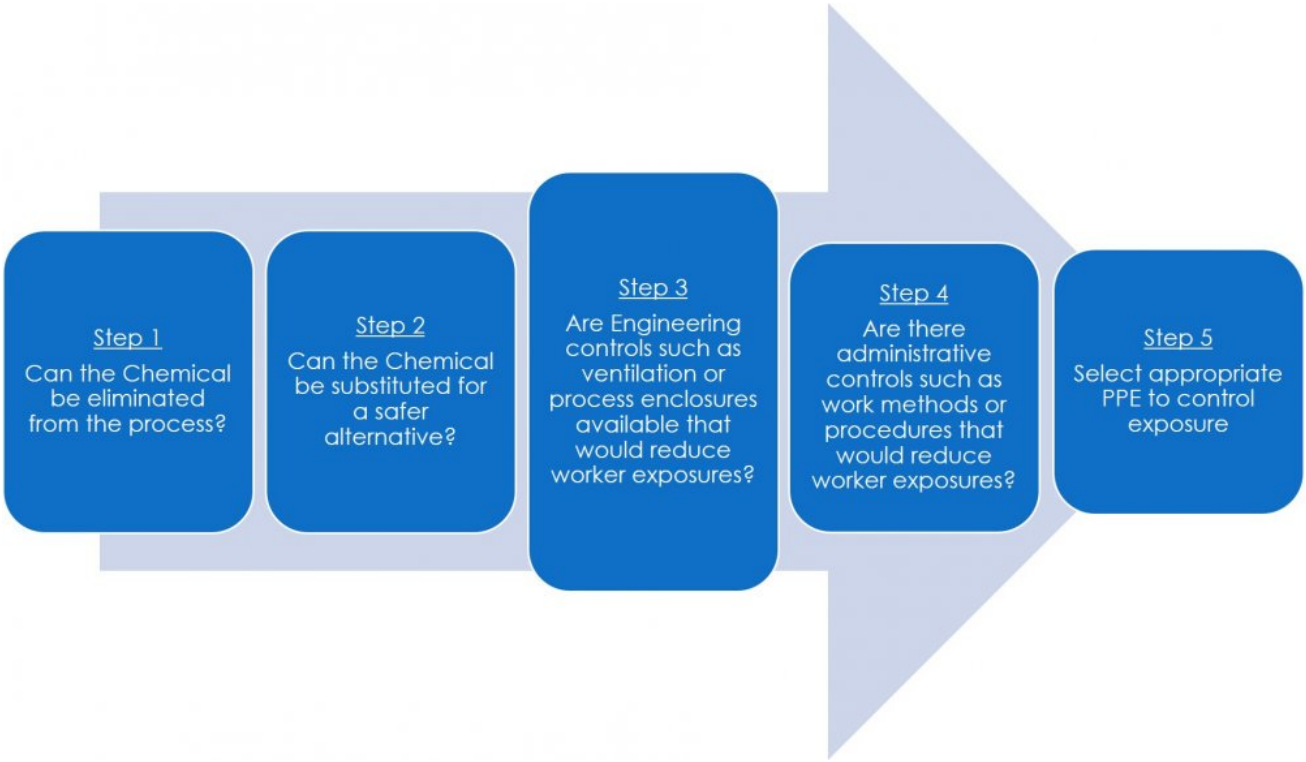
7.3. Hierarchy of Controls

The hierarchy of controls was established as a process to assist companies in identifying the most effective means of controlling hazards. As you move down the hierarchy, the controls become less reliable and effective at protecting workers. It is recognized that, at this time, not all hazards can be eliminated, however companies should attempt to evaluate control options at each level and only proceed down the hierarchy when no viable opportunities are available.



For Example:

If a facility is using a chemical which generates hazardous airborne contaminants to which workers may be exposed, the facility must evaluate whether safer chemical alternatives or engineering controls such as ventilation are available before moving down the hierarchy and selecting PPE as a control measure.



Note: In some cases, a combination of controls may be needed (i.e. engineering control and PPE) if the individual control does not reduce the hazard(s) to acceptable levels (i.e. below the associated OELs).

Hierarchy of Controls Resources

The U.S. National Institute for Occupational Safety and Health (NIOSH) Hierarchy of Controls Website

Note that regulatory references on this website are country specific and may not apply to your facility.

7.4. Reducing Exposure

View the sections below for detailed information on reducing exposures through:

- Ventilation
- Safe Use & Work Practices
- The selection and use of Personal Protective Equipment

7.4.1. Ventilation

Ventilation is used to control the build-up of airborne contaminants in order to reduce worker exposure and the potential for fire or explosion. The following provides examples of the types of ventilation commonly used to control airborne contaminants in manufacturing processes:

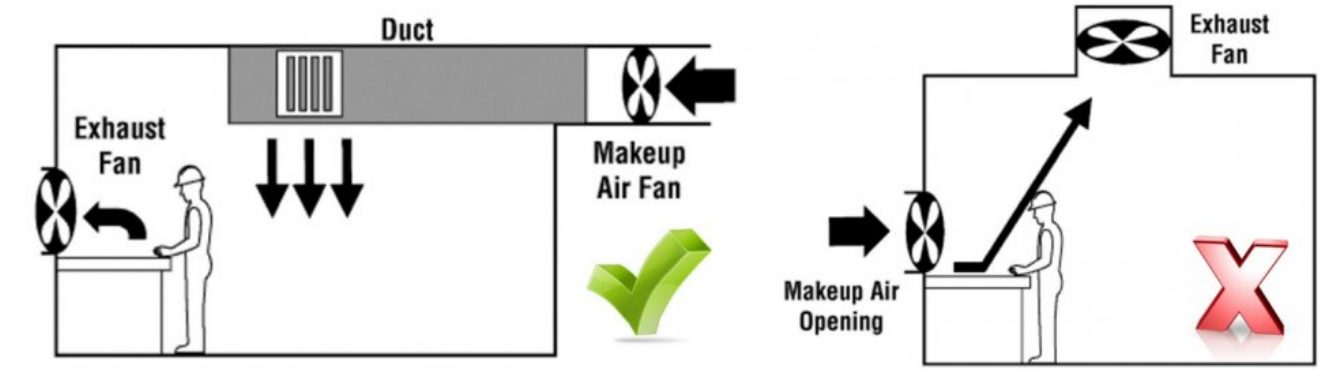
✻ Ventilation systems are complex systems that require proper design and configuration in order to be effective. It is recommended that qualified ventilation experts such as ventilation design engineers or Certified Industrial Hygienists (CIH) be consulted when designing and installing ventilation systems.

General or Dilution Ventilation

General ventilation works on the principle of removing and replacing contaminated air before chemical concentrations reach unacceptable levels. General ventilation should be designed to create directional (one-way) airflow within an area and carry contaminated air away from the breathing zone of workers.

General Ventilation works best when:

- Contaminant emissions are widely dispersed within the work area
- Exhaust openings are near the contaminant source
- The worker(s) is upstream of the contaminant



Source: *Industrial Ventilation,* Canadian Centre for Occupational Health & Safety (CCOHS)
http://www.ccohs.ca/oshanswers/prevention/ventilation/

! General ventilation is not effective for controlling toxic levels of hazardous substances that are approaching or exceed permissible exposure limits.

Local Exhaust Ventilation

Local exhaust ventilation is designed to mitigate specific (local) sources. Ventilation hoods or vents are used to capture and directly remove contaminated air from the source.

Local Ventilation works best when:

- Ventilation hoods or vents are located as close as possible to the source of contamination
- Worker(s) are **not** positioned within the flow of contaminated air
- There are no strong cross-drafts (i.e. from floor or wall-mounted cooling fans)

Ventilation Resources

Ventilation Inspection Checklist

U.S. OSHA Technical Manual Section III: Chapter 3

Canadian Centre for Occupational Health and Safety (CCOHS): OHS Fact Sheet Industrial Ventilation

> ! *Note that regulatory any references on the websites above are country specific and may not apply to your facility.*

7.4.2. Safe Use and Work Practices

Work practices and the safe use of chemicals can help reduce employee exposure to chemicals. The following are examples of good practices for reducing worker exposures using safe work methods and good hygiene practices.

Safe Use & Work Practices

Whenever possible, chemicals with low boiling points (i.e. organic solvents commonly found in glues/ adhesives, primers, inks, thinners cleaners) should be firmly sealed and contained. This reduces chemical loss though evaporation (or volatilization), and reduces the amount of chemicals released into the air. This may be accomplished in the following ways:

- The use of application tools or containers that are covered or have only small openings
- The use of gravity or pressure-fed solvent applicators systems
- Ensuring all chemical containers are closed with appropriate lids or caps

Additionally, in any scenario where workers may come into contact with chemicals during their application, using appropriate application tools (i.e. brushes and applicator bottles are preferred over applying chemicals with rags) should be used to reduce the risk of exposure and the need for PPE.

Good Hygiene Practices

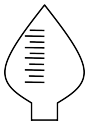
In areas where chemicals are used, it is important to ensure that the proper hygiene facilities are available, and that employees understand the importance of proper hygiene in reducing exposure risks. The following practices should be encouraged at your workplace to reduce the risk of employee exposures:

- Providing separate personal storage areas and ensuring that employees keep personal items, such as food, drink, cosmetics and tobacco, separate from the work environment.
- Providing washing areas with gentle soaps and clean towels, and encourage employees to maintain good personal hygiene by washing hands and exposed areas of skin periodically, especially before breaks, meals, and after shifts.
- In areas where chemicals may contaminate an employees clothes, provide work clothing or coverings (e.g., uniforms or coveralls). Employees should change contaminated work clothing during the work shift, and they should change from contaminated work clothes into street clothes before leaving work.

7.4.3. Personal Protective Equipment (PPE)

It is important to remember that personal protective equipment (PPE) should only be used as a last resort if **no** other control methods are available or sufficient. For tasks where PPE is needed, it must be selected based on a formal job hazard review that identifies the specific chemical or physical hazards and the proper type of PPE.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:



Chemicals Management – Level 1: Question 5

> The SDS for each chemical should be referenced to identity chemical hazards that employees are potentially exposed to and to find additional PPE recommendations.

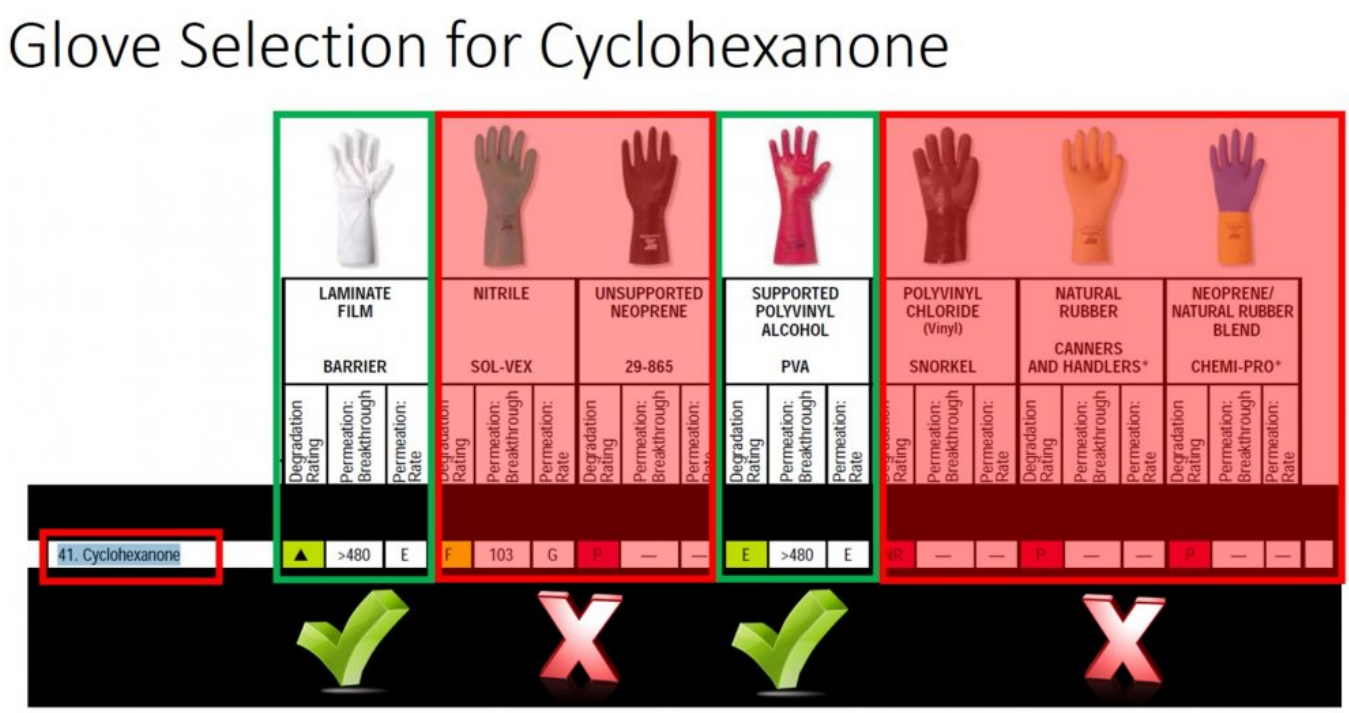
7.4.3.1. Face, Hand & Body Protection

The information below contains basic information, tools, and recommendations for scenarios when PPE for the face, hand, and body may be required, and outlines the proper selection based on the chemicals involved:


PPE – Face and Body Protection

Chemical Resistant Glove Selection

There is no one glove material that provides protection against all chemical types. Glove material must be selected based on the chemicals with which workers are expected to come into contact. Selecting the proper protective material should be done using of a glove chart provided by the glove supplier. As demonstrated in the example below, glove charts provide technical information on the level of protection of various glove materials against specific chemicals.



> ! Glove charts are specific to each manufacturer. If your glove supplier cannot provide this information, it is recommended that gloves be purchased from a supplier that can provide an appropriate glove chart and/or technical information on breakthrough times and permeation rates for glove materials. Without this information, it is difficult to determine whether gloves can provide the right level of protection.

Use & Maintenance of Gloves

Gloves should be inspected before each use to ensure that they are in acceptable condition and do not show signs of:

- Discoloration

- Drying or cracking
- Swelling
- Holes

Gloves showing and of the signs noted above or any other defects should be discarded and replaced.

✻ Both employees and supervisors should be trained on the signs of glove breakdown. When using gloves for the first time, initial observations and monitoring periods can help determine how often gloves need to be changed.

Face Protection

Face and eye protection should be considered whenever there is a risk of chemicals contacting an employee's face or eyes (i.e. splashing, spraying, airborne mists). Selection of the appropriate protective equipment should be based upon the associated risks. Provided below are examples of different face/ eye protective equipment and descriptions of when they may be appropriate:

Face shields are designed to protect the entire face and neck, and can provide better comfort and ease of use for intermittent tasks such as chemical transfer, mixing, or cleaning.

Goggles provide sealed eye protection and defend against airborne mists. Goggles may be appropriate for tasks involving mixing, transfer, or cleaning, however ease of use may be a factor if task occurs intermittently.

Safety Glasses (with side shields) provide protection against splashes, but are not fully sealed. These may be useful for tasks that are continuous or have impact risk.

PPE Resources

U.S. OSHA – Personal Protective Equipment

! *Note that any regulatory references in this link are country specific and may not apply to your facility.*

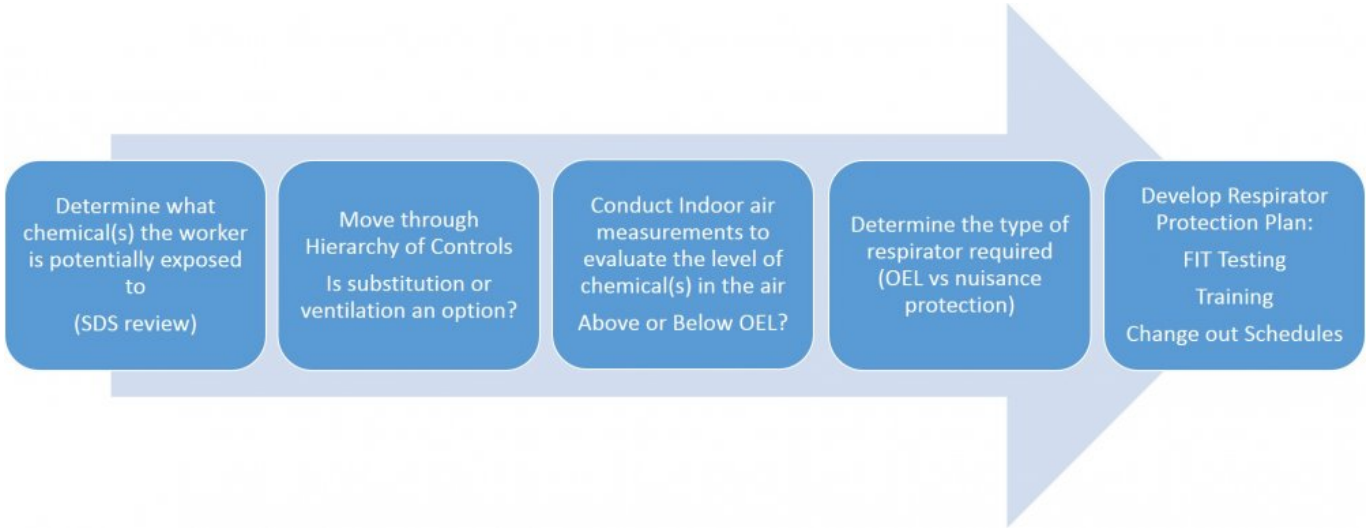
7.4.3.2. Respiratory Protection

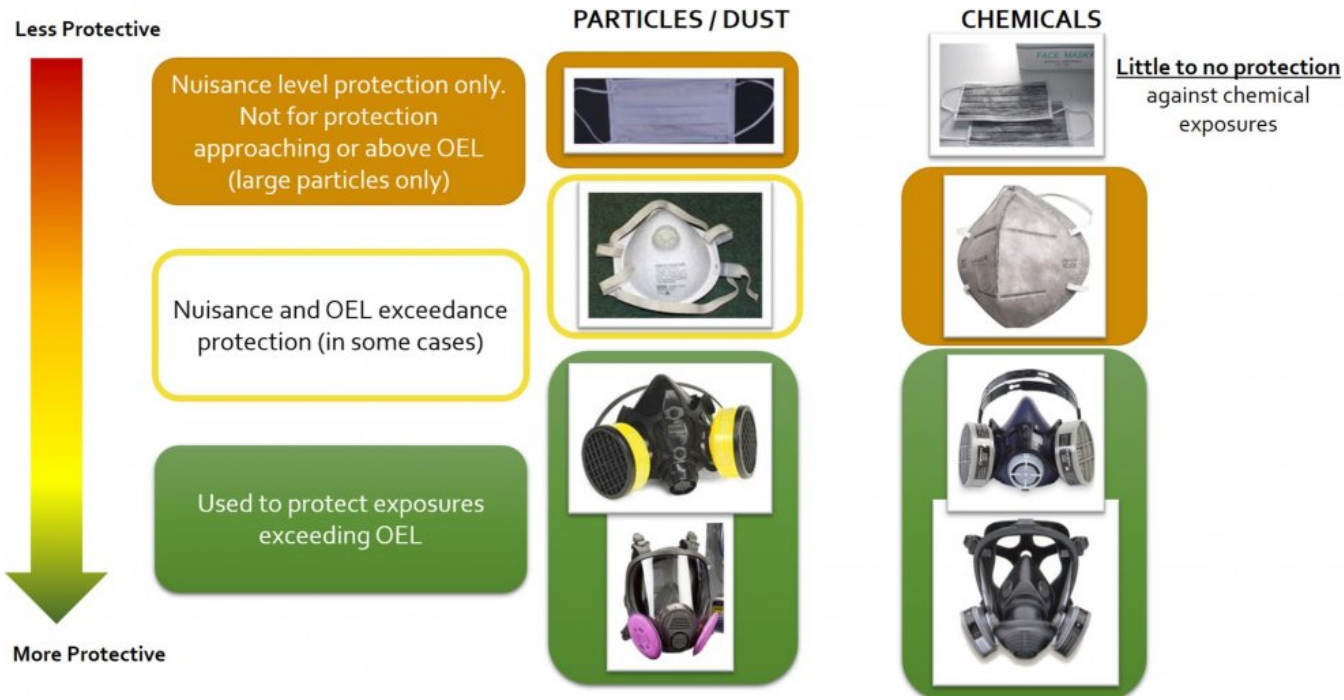
The information below contains basic information, tools, and recommendations for scenarios in which respiratory protection may be required and outlines the methods for proper selection:

PPE – Respiratory Protection

Respirator Selection

It is important to note that typically, respirators are used to reduce a worker's exposure below an established regulatory occupational exposure limit (OEL), and only in instances where other controls (i.e. ventilation) are not effective or feasible. Respirators may be worn to provide relief from nuisance odors, particles, or fibers. The examples below demonstrates an appropriate respirator selection process, as well as when to select specific respirator types.





! The selection of respirator and/or cartridge type is dependent on the specific chemical or groups of chemicals that employees may be exposed to For example, there are specific cartridges for organic vapors and acids gases as well as others. Additionally, respiratory protection should be certified to country-specific or internally recognized criteria for respiratory protection such as those established by the National Institute for Occupational Safety and Health (NIOSH).

NIOSH Certified Respiratory Protection Database

Respirator Fit and Use

To be protective, respirators must form a tight fitting seal around the wearer's face, particularly around the mouth and noise. As respirators are available in a variety of sizes, employees required to wear respirators should be appropriately fitted through a fit testing program (see the Respiratory Protection Program section below) to ensure that they are provided with respiratory protection that fits properly and offers the desired level of protection.

> ! Facial hair or using a surgical mask under a respirator does not allow for a tight fitting seal and can significantly reduce the effectiveness of a respirator.

Use of Facemasks

> ! Surgical masks (sometimes referred to as facemask) are not respirators. They do not meet applicable criteria for respiratory protection devices and cannot provide a quantifiable level of protection.

Facemasks are a specific type of PPE that are designed to prevent the spread of large particles typically generated by the wearer (e.g. spit, mucous) within the work environment. Facemasks are not designed or certified to prevent the inhalation of small airborne contaminants or gases (e.g. chemicals).

Facemasks are also not designed to seal against the face and cannot be fit tested. Therefore, there is no Assigned Protection Factor (APF) for facemasks. During inhalation, much of the air passes through gaps between the face and the mask. The mask material is also not designed to capture small particles.

These surgical type of facemasks may be useful in certain environments to prevent irritation from large fibers and particles, but should **NEVER** be used to protect against exposures to chemicals or dusts above applicable permissible exposure limits (PEL).

Respiratory Protection Program

If respiratory protection is required, it is important to establish a written Respiratory Protection Program that includes procedures for the following:

- Selection of appropriate respirators
- Fit testing
- Employee training training
- Proper use (inspection, cleaning, maintenance, and storage)
- Medical evaluations

 Sample Respiratory Protection Program

Respiratory Protection Resources

 U.S. OSHA eTool – Respiratory Protection

 U.S. OSHA – Respiratory Protection Publication

 3M Respirator Selection Guide

> ! *Note that any regulatory references in the provided links are country specific and may not apply to your facility.*

7.5. Downloadable Training Materials – Chemical Exposure & Controls

Powerpoint Slides

 Occupational Exposure Assessments

 Controlling Chemical Hazards – Hierarchy of Controls

 Controlling Chemical Hazards – Ventilation

 Controlling Chemical Hazards – Face Hand & Body Protection

 Controlling Chemical Hazards – Respiratory Protection

Activities

 Occupational Exposure Limits Activity

 Hierarchy of Controls Activity

 Hazard Assessment and Control Case Study Activity

8. Environment / Chemical Disposal

All processes that utilize chemicals will produce some degree of impact on air and water quality, and will generate hazardous waste. These byproducts have the potential to enter and negatively impact the surrounding environment, and commonly do so via the following means:

- Contamination of water systems (i.e. sanitary, or storm water systems)
- Process or fugitive air emissions
- Improper disposal of hazardous wastes
- Accidental releases (i.e. spills)

As noted in the Chemicals Management Systems section, an effective chemicals management program will include established policies and procedures to address any potential emission to the environment. The foundation of managing environmental impacts includes the following:

- Having dedicated staff with the appropriate qualifications and knowledge regarding your facility's environmental aspects and impacts.
- Identifying all legal requirements with respect to wastewater, air emissions, hazardous wastes, and non-hazardous wastes.
- Obtaining the required permits and/or licenses for any environmental discharges.
- Testing or monitoring to ensure the quantity and quality of all hazardous material discharges and emissions complies with relevant laws and permit requirements. This includes wastewater, air emissions, and hazardous waste discharges.

Environmental Management System Resources

Framework and/or certification from internationally recognized management systems such as ISO 140001 can be referenced or used in creating your environmental management program.

International Standards Organization [ISO]

U.S. EPA Environmental Management Systems U.S. EPA Environmental Management Systems

8.1. Wastewater

Chemicals discharged in wastewater can have a detrimental impact on the surrounding surface and groundwater systems. In general, there are three types of wastewater that may be discharged from a facility:

- **Industrial Wastewater** – Wastewater generated from industrial operations including process wastewater, wastewater from utility operations, run-off from process and materials staging areas, and auxiliary activities including wastewater from cleaning equipment and tool, laboratories, maintenance shops, etc.
- **Sanitary or Domestic Wastewater** – Wastewater generated from domestic activities such as bathrooms, hand washing, food preparation.
- **Stormwater** – Water generated via precipitation, as in rain or snow melt.

Wastewater Management

In order to ensure all wastewater discharges are managed responsibly, it is important to consider the following:

- Have you Identified the type, quality, and sources of all wastewater generated on-site?
- Have you Identified the applicable legal requirements for wastewater discharge (as defined by local law and/or brand partner)?
- Have you obtained the applicable discharge licenses and/or permits?
- Do you have a wastewater testing program in place to ensure compliance with applicable discharge permits and limits?
- If your facility has a wastewater treatment system on-site, are there procedures in place for:
    - The operation and regular maintenance of the treatment system and equipment (including on-site laboratories).
    - Assigning dedicated staff to monitor wastewater treatment operations.
    - Appropriate training for all relevant staff.
    - Emergency or contingency plan in case of treatment system failure.

> If you are having trouble finding Country or Provincial wastewater regulations, you should contact your local government's environmental protection bureau for assistance with obtaining a copy of the regulation(s) or the correct legal reference(s).

Wastewater Testing

All wastewater should be tested to ensure compliance with applicable discharge limits. The testing frequency (i.e. quarterly, annually) and monitored parameters is often defined by local law/permit and/or customer (Brand) requirements. To ensure compliance, companies should:

- Identify the required testing frequency and establish a regular testing schedule to meet these requirements.
- Ensure that wastewater is collected and tested in accordance with local law or internationally accepted methods.
    - Any contracted Laboratories should be ISO 17025 certified and/or a national accrediting body that is member of International Laboratory Accreditation Cooperative (ILAC).
- Create a documentation control program to maintain wastewater testing records.

Additional information on wastewater testing programs, sampling and analytical testing methods, and criteria has been developed by the Zero Discharge of Hazardous Chemicals (ZDHC) group and can be downloaded here:

ZDHC Wastewater Quality

Stormwater Management

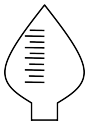
Contamination of stormwater (i.e. rainwater run-off) systems can cause untreated wastewater to be discharged to the environment. Follow these good practices outlined below to ensure your stormwater

system is free of contamination.

Prevention of Contamination of Stormwater Systems

- ✓ Separate or protect stormwater drains from areas of chemical storage or use.
- ✓ Install sufficient barriers (e.g. sloped flooring systems, berms) to prevent industrial wastewater from entering the stormwater system or surrounding environment.
- ✓ Ensure all machinery and/or parts stored outdoors are protected from rainwater intrusion.
- ✓ Regular maintenance of all wastewater drains and channels to ensure they are free of debris and risk of overflow or back-up.
- ✓ Regular inspection of machinery and vehicles to check for chemical, oil, or fuel leakage.
- ✓ Appropriate spills response procedures and equipment in all chemical storage and use areas. This includes auxiliary chemicals such as fuel storage tanks and/or other non-production chemicals.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:


Section 4: Wastewater / Effluent

Wastewater Management Resources


Wastewater Good Practices


Wastewater Management Checklist


IFC Environmental Health and Safety Guideline – Wastewater


Wastewater Emergency Plan Sample

8.2. Air Emissions

Air emissions can have a negative impact on the workplace and surrounding air quality. Common air emissions include contaminated dust, oil mists, acid vapors, volatile organic compounds, and emissions from combustion sources (i.e. boilers). Emission sources are typically classified as one of the following:

- **Point Source Air Emissions** – Emissions from stationary process stacks or vents (i.e. local ventilation or boiler exhausts)
- **Fugitive Air Emission** – Emissions that are released into the general working environment or outdoors that are not directed through process vents or stacks (i.e. uncontrolled processes or chemical storage/mixing areas)

Air Emissions Management

In order to ensure all air emissions are managed responsibly it is important to consider the following:

- Have you Identified the location of all air emissions generated from the site?
- Have you Identified the applicable legal requirements for air emissions (as defined by local law and/or by your brand partner)?
- Have you obtained all applicable discharge licenses and/or permits?
- Do you have an emissions testing program in place to ensure compliance with applicable discharge permits and limits?

> ✻ If you are having trouble finding Country or Provincial air emissions regulations, you should contact your local government's environmental protection bureau for assistance with obtaining a copy of the regulation(s) or the correct legal reference(s).

Air Emissions Inventory

An air emission inventory is an accounting tool that identifies all sources of emissions on-site and tracks the quantity of pollutants that are emitted from each source. When creating an emissions inventory, it should include the following information:

- A list of all point source and/or fugitive emissions.
- Contaminants emitted from each source (i.e. dust or particulate matter, volatile organic compounds, ozone depleting substances).
- The quantity of pollutants emitted from each source. This can be determined through emissions testing or engineering calculations and emissions modelling.
    - Annual aggregated (mass emission) quantities of air pollutants should be determined (i.e. kg/year).

 Air Emissions Inventory Sample

Air Emissions Testing

For any air emissions sources that require testing, the testing frequency (i.e. quarterly, annually) and monitored parameters are often defined by local law/permit and/or customer (Brand) requirements. To ensure compliance, companies should:

- Identify the required testing frequency and establish a regular testing schedule to meet these requirements.
- Ensure that any emissions testing is performed in accordance with local law or internationally accepted testing methods.
- Create a documentation control program to maintain air emissions testing records.

 U.S. EPA Summary of Emissions Testing Methods

Ozone Depleting Substances

Ozone Depleting Substances (ODS) are those substances which deplete the ozone layer. ODS widely used in air conditioners and cooling equipment, fire extinguishers, dry cleaning, cleaning solvents, electronic equipment, and agricultural fumigants. ODS include chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). An example of an HCFC is R-22, which is a commonly used refrigerant in air conditioning equipment.

ODS, as their name implies, produce a negative impact on the the earth's ozone layer, and also have been positively linked to global warming. Most ODS are assigned Ozone Depletion Potential (OPD) and Global Warning Potential (GWP) values that are used to determine the degree of impact an ODS will have on ozone depletion and global warming. Additional information including a list of ODS compounds can be found on the U.S. EPA's website link provided below.

 U.S. EPA ODS Website

ODS Management

In order to ensure all ODS are managed responsibly, it is important to maintain the following good practices:

- Maintain an inventory of ODS that are stored and used at the facility (ODS can be included in the facility's air emissions and/or greenhouse gas inventory)
- Identify and comply with all applicable laws, regulations and permits related to Ozone Depleting Substances, including required phase out plans
- Implement a regular maintenance program for ODS containing equipment in order to prevent leaks
- Adopt a phase out program to progressively reduce the use of ODS on-site

Information on alternatives to ODS can be found on the U.S. EPA's Significant New Alternatives Policy (SNAP) Program website link provided below.

U.S. EPA SNAP Website

If you are having trouble finding Country or Provincial ODS regulations, you should contact your local government's environmental protection bureau for assistance with obtaining a copy of the regulation(s) or the correct legal reference(s).

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Section 6: Air Emissions

Air Emissions Resources

Air Emissions Good Practices

Air Emissions Management Checklist

IFC Environmental Health and Safety Guideline – Air Emissions

8.3. Hazardous Waste

Hazardous wastes have properties that make it dangerous or potentially harmful to human health or the environment. it is therefore important for manufacturing facilities to implement good waste management practices to ensure hazardous wastes are managed responsibly.

Hazardous Waste Management

In order to ensure all hazardous waste is managed responsibly, the following must be considered:

- Have you Identified which types of hazardous wastes are generated at the site?
- Have you Identified the applicable legal requirements for the generation, storage, and disposal of hazardous wastes (as defined by local law and/or brand partner)?
- Have you obtained the applicable hazardous waste generator and/or discharge licenses and/or permits?
- Are all hazardous wastes being collected by qualified (licensed) hazardous waste carriers?
- Have you established a document control procedures to maintain records of all hazardous wastes?

> If you are having trouble finding Country or Provincial hazardous waste regulations, you should contact your local government's environmental protection bureau for assistance with obtaining a copy of the regulation(s) or the correct legal reference(s).

Identification

Hazardous wastes posses specific characteristics which make them hazardous (i.e. they are flammable, toxic to the environment, etc.) Hazardous wastes are often grouped into different classes and assigned a hazardous waste number (i.e. HW-001). The document below provides general guidance on determining whether a waste is hazardous, however country-specific definitions and classifications are often defined in local laws and should be consulted when identifying which types of hazardous wastes are generated at your facility.

Hazardous Waste Determination Guidance

> Wastes that are classified as non-hazardous may still pose a threat to human health and the environment if not managed properly. As a good practice, apply the general waste management principles outlined in this section for the identification, separation, storage, and disposal all wastes (hazardous and non-hazardous).

Separation & Storage

Hazardous wastes should be separated from non-hazardous waste and further separated from other incompatible hazardous wastes (i.e. flammables, oxidizers).

SDS for materials and their wastes should be reviewed when determining hazardous waste separation and storage requirements. A proper waste separation program will help to isolate and reduce the amount of hazardous waste generated, and may also reduce disposal costs. Clearly marked waste bins should be placed in convenient locations (i.e. nearby hazardous waste generations areas).

For Example: Consistent color-coding of waste bins throughout the facility can help ensure hazardous waste and other waste is properly separated.

Hazardous waste collection or storage areas present similar risks to that of other chemical storage areas, and require safety features for the protection of employees and the environment. By following the good practices outlined below, you can better ensure that your hazardous waste storage areas have the appropriate protections.

Features of a Safe and Secure Hazardous Waste Storage Area

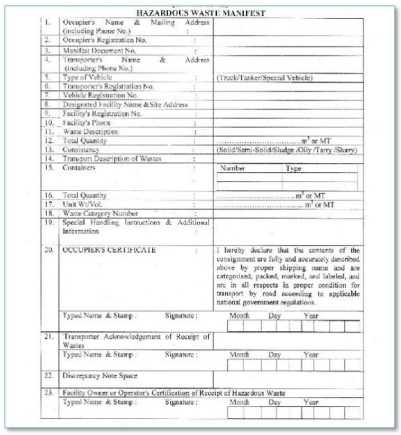
- ✓ Impervious surfaces and secondary containment are present.
- ✓ Proper signage and labels are present on all waste containers.
- ✓ Protection measures from fire risks, if flammable wastes are taken.
- ✓ Waste area is well ventilated.
- ✓ Protection from direct sunlight or other weather conditions are provided.
- ✓ Security to prevent accidental damage or unauthorized entry is provided.
- ✓ Spill clean-up equipment is readily available.

Disposal

Hazardous wastes require special treatment and disposal techniques to eliminate their potential impacts on the environment. To ensure your hazardous wastes are being properly disposed, your company should partner with qualified (licensed) hazardous waste collection and disposal providers. When selecting your waste collectors you should request and review the following:

- A copy of their business license and operating permit.
- Detailed information on the types and quantities of hazardous wastes they can accept and process.

- Verify that they can accept the specific class of hazardous wastes that your facility generates.



HAZARDOUS WASTE MANIFEST

1.	Occupier's Name & Mailing Address (including Phone No.)	
2.	Occupier's Registration No.	
3.	Manifest Document No.	
4.	Transporter's Name & Address (including Phone No.)	
5.	Type of Vehicle	(Truck/Tanker/Special Vehicle)
6.	Transporter's Registration No.	
7.	Vehicle Registration No.	
8.	Designated Facility Name &Site Address	
9.	Facility's Registration No.	
10.	Facility's Phone	
11.	Waste Description	
12.	Total Quantity	..... m³ or MT
13.	Containers/no	(Solid/Semi-Solid/Sludge /Oily /Tarry /Slurry)
14.	Transport Description of Wastes	
15.	Containers	Number / Type
16.	Total Quantity	..... m³ or MT
17.	Unit Wt/Vol.	..... m³ or MT
18.	Waste Category Number	
19.	Special Handling Instructions & Additional Information	
20.	OCCUPIER'S CERTIFICATE	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorized, packed, marked, and labeled, and are in all respects in proper condition for transport by road according to applicable national government regulations.
	Typed Name & Stamp: Signature:	Month Day Year
21.	Transporter Acknowledgement of Receipt of Wastes	
	Typed Name & Stamp: Signature:	Month Day Year
22.	Discrepancy Note Space	
23.	Facility Owner or Operator's Certification of Receipt of Hazardous Waste	
	Typed Name & Stamp: Signature:	Month Day Year

Maintain Records of Disposal

- Ensure all legally required hazardous waste manifests are obtained and that all appropriate records are kept on file.
  - Records should typically be kept for a minimum of 5yrs, or longer if required by local law.

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Section 5: Waste

Hazardous Waste Resources

Hazardous Waste Management Good Practices

Hazardous Waste Management Checklist

IFC Environmental Health and Safety Guideline – Waste Management

8.4. Emergency Preparedness

Emergency preparedness is an important part of a chemicals and environmental management program. Companies that use and store chemicals should have appropriate procedures in place to manage any chemical accidents such as spills.

Spill Management

Be prepared to respond to all chemical spills by:

- Establishing spill response procedures for all potential chemical spills (large and small).
- Providing training to relevant employees on spills response procedures.
- Maintaining fully stocked spills response kits and appropriate PPE in areas of chemical storage and use.
- Maintaining appropriate first aid equipment (i.e. eye/body wash stations).

When creating emergency response procedures, the SDS for each chemical should be reviewed as it contains important information on how to appropriately respond to emergencies such as spills. Helpful SDS sections include:

- *SDS Section 4* – First Aid
- *SDS Section 5* – Firefighting measures
- *SDS Section 6* – Accidental release measures
- *SDS Section 8* – PPE
- *SDS Section 10* – Chemical reactivity and compatibility
- *SDS Section 13* – Disposal considerations

> ! If an SDS does not contain this information, contact the chemical supplier immediately to obtain this information.

Spill Response Equipment

Spill kits should be provided and made easily accessible in relevant areas in the workplace. Commercially available spill kits can be purchased or companies can create their own. A good spill kit should include the following items:

- **Containment/Absorbent Materials**
  - Solvents/Organic Liquid Absorbent: Inert absorbents such as vermiculite, clay, or sand

- Absorbent pads or rolls
- Acid Spill Neutralizer: sodium bicarbonate, sodium carbonate or calcium carbonate
- Alkali (Base) Neutralizer: sodium bisulphate, boric acid or oxalic acid

> ! Containment and absorbent materials should be compatible with the potential chemicals that need to be contained/absorbed. This information is often available on the SDS. Additional information on chemical compatibility can and should be obtained from the supplier of the containment and/or absorbent materials, wherever applicable.

- **Personal Protective Equipment (PPE)**
  - Hand protection (Chemical resistant safety gloves)
  - Eye protection (Safety goggles)
  - Body protection (protective clothing and/or apron)
  - Foot protection (Closed-toed shoes or shoe covers)
  - Respiratory protection

- **Clean Up Material**
  - Brooms, dustpan, shovel to sweep up the absorbent material
  - Plastic tongs/ scoops to pick up contaminated absorbent material
  - A chemical resistant bin with a tight fitting lid to store contaminated clean up materials (absorbent, PPE)

> ! It is important that spill kits are tailored to meet the specific needs of each work area and the types of chemicals in that area. SDS contain information on how to respond to spills including first aid measures and should be reference when creating your emergency response procedures.

Responding to Spills

All spills should be cleaned up immediately. Response procedures may vary depending on the amount and types of chemical(s) spilled, however the image below outlines the basic steps to be taken in the

event of a chemical spill:

Relevant Higg Index Facility Environment Module (FEM) 3.0 indicators:

Chemicals Management – Level 1: Question 4

Emergency Preparedness Resources

The following websites serve as databases of information and offer downloadable tools for emergency response to chemical spills, including chemical hazard data sheets, reactivity data, and emergency response recommendation.

CAMEO Chemicals Database

WISER

8.5. Downloadable Training Materials – Environment/Chemical Disposal

Powerpoint Slides

Environmental Management

9. Attributions

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