

High-risk management standard

HAZARDOUS MATERIALS & CHEMICALS DELIVERY, STORAGE & HANDLING



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azardous materials and chemicals are of major relevance within Veolia's workplaces. They have the ability to cause adverse health effects to workers.

Hazardous materials and chemicals are all around us, and the hazards are not always obvious or easy to identify. This standard aims to prevent and reduce work-related deaths, illnesses and injuries.

SCOPE:

This document applies to all activities and sites of Veolia. This standard is limited to hazardous materials and chemicals covered by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This standard also covers chemical substances that are not considered as hazardous, but may under certain conditions (temperature, contact with other substances, or light) cause hazardous situations.



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1.0 > Definitions

A material or chemical is hazardous to health by either its physical properties and/or chemical characterisation, which corresponds at least to one hazard class of GHS identified in its Material Safety Data Sheet (MSDS).

A hazardous chemical is an agent that:

- Can be in a state of solid, liquid or gas, or their combinations (including vapour, smoke, powder and aerosol).
- Can be in a form of single substance or a complex mixture.
- Is delivered in the workplace, generated by a process (e.g., dust) or work activity including by-products or hazardous waste.

The risks of hazardous materials and chemicals in the workplace may occur during their:

- Delivery : weighting and sampling.
- Storage : unloading, storage, inventory, and final storage.
- Operation & Maintenance : different processes (handling, concentration adjustment), waste disposal, and leaning.

Human exposure to hazardous materials and chemicals may lead to :

- Acute effect (skin corrosion, burns)
- Chronic effects (asthma, allergies, cancer).

The impact of hazardous materials and chemicals may be influenced by:

- Presence and possible interactions with other chemicals (effects are mostly multiplied).
- Physical conditions (humidity, wind, temperature, volatility, etc.).
- Duration and frequency of exposure (short-term, long-term).
- Type of exposure : local or systemic.
- Way of penetration into the body (inhalation, skin contact and ingestion).

2.0 > Main health hazards

Hazardous materials and chemicals present physical, health and/or environmental hazards. There are nine hazard classes based on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). According to

circumstances, all hazardous classes can be hazardous to human health. The following table shows how substances are labelled under GHS system.

Pictograms	Description	Usage	Example of potential hazards (non exhaustive)	Example of potential effects on the human body (non exhaustive)
	Carcinogen Reproductive Toxicity Mutagenicity	Removal of asbestos Waste water analysis (potassium dichromate) Heat input (fuel oil)	Damage to the genetic material of the cells	May cause cancer, genetic defects, fertility or unborn child Causes damage to organs
	Acute toxicity (Severe)	Water disinfection (chlorine, etc.)	Speed of body function is changed due to exposure by poison	Small quantities are harmful or fatal
	Explosive	Not common within Veolia core businesses	Fire, blast pressure and projectiles	Serious injuries are common, fatalities may occur
	Corrosive	pH control (sulfuric acid) Flue gas treatment (sulphur / chloride treatment with caustic soda)	Chemical reaction with body tissues	Cause severe skin burns and eye damages
	Oxidizers	Water disinfection (ozone) Heat input (oxygen)	Fire, blast pressure and projectiles	May cause burns or injuries by projectiles
	Flammable	Bacteria nutrient in waste water treatment (methanol, ethanol) Heat input (fuel oil)	Fire	May cause burns
	Gas under pressure	Blanketing (nitrogen for water applications, carbon dioxide for waste application)	Blast pressure and projectiles	Cause cryogenic burns or injury
	Irritant Harmful	Coagulation/flocculation (polymers, aluminium sulphate, lime) Sulphur treatment (iron chloride)	Speed of body function is changed due to exposure by poison Chemical reaction with body tissues	Cause irritation Cause dizziness
	Hazardous to the environment	Water disinfection (sodium hypochlorite) Boiler water treatment (hydroquinone)	Pollution	May poison the food chain



3.0 > Risk management for hazardous materials and chemicals

It is necessary to conduct a risk assessment to evaluate any potential risk outcome that may arise from hazardous materials and chemicals

for different work operations. Records must be maintained and updated.

3.0.1 – Risk assessment

> Activity		> Records
Hazard	Identify substances and mixtures¹ in the workplace and determine which are deemed hazardous	MSDS List of hazardous materials and chemicals (hazard categories, their location, the quantities stored) Statutory limits
Exposure	Identify who is at risk (division into departments, tasks or processes that utilize hazardous materials and chemicals)	Exposure details and person exposed
	Identify exposure details (routes of entry into the body, quantity manipulated over time, duration and frequency of exposure, physical form of chemicals)	
Risk	Determine the associated risk with assigning a priority for correction GROSS RISK = HAZARD x EXPOSURE	Assessment of the Risks with Risk Index
Risk Control	Define actions to reduce risks, using risk index to determine priorities	Action Plan Recommendations with Risk Reduction Measures
	Identify the effectiveness of control measures RESIDUAL RISK = HAZARD x EXPOSURE x CONTROL MEASURES Control of action plans	Progress report for implementation of the risk reduction measures Audit report

The risk assessment needs to be updated at least once a year or whenever necessary (e.g., introduction of a new substance into the workplace, in case of accidents or near misses, implementation of new control measures, changes to the process or plant).

¹Mixture or waste are considered hazardous if they exhibit at least one of the GHS hazardous characteristics

3.0.2 – Hierarchy of risk control

Control measures must be ranked from the highest level of protection and reliability to the lowest. This ranking is known as the HIERARCHY OF CONTROL or RISK MANAGEMENT HIERARCHY. One must always aim to **eliminate a hazard,**

which is the most effective control. If it is not reasonably practicable to do so, the risk must be minimised to the lowest level as reasonably practicable by one or a combination of the following:

HIGHEST	ELIMINATION	Can hazardous materials and chemicals be totally eliminated? Can the work be done another way?	MOST
Health & Safety Protection 	SUBSTITUTION	Can the hazardous material be replaced for a less hazardous material?	Reliability of control measures 
	ENGINEERING	Can the equipment be designed in a way that it will keep personnel remote at all times from hazardous materials and chemicals?	
	COLLECTIVE PROTECTIVE EQUIPMENT	Can the hazardous materials and chemicals be contained or can shields/screens be put in place to prevent personnel exposure to hazardous materials and chemicals?	
	ADMINISTRATIVE CONTROLS	Can training, increased supervision, procedures, rotation and signage minimize exposure to hazardous materials and chemicals?	
LOWEST	PERSONAL PROTECTIVE EQUIPMENT	Can personal protective equipment (PPE) protect the person from exposure to hazardous materials and chemicals?	LEAST



4.0 > Requirements

Application

This High-Risk Management Standard applies to all confined spaces entry.

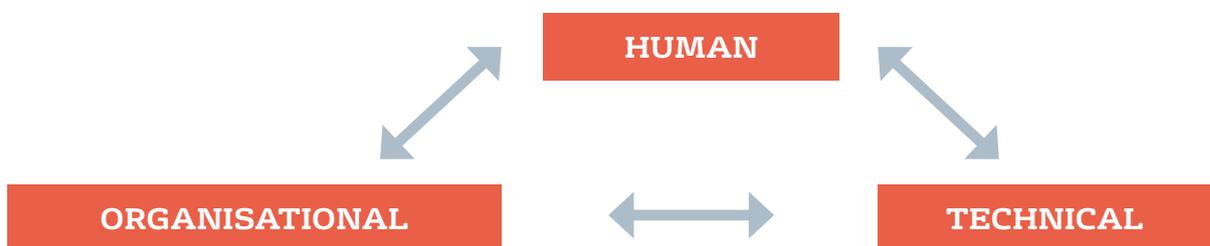
This standard applies to all managers, employees, contractors, visitors or any other person working on the scope of Veolia business undertakings and operations.

This standard applies in addition to requirements prescribed by prevailing legislation, codes of practice, international standards and health & safety recommendations from manufacturers and risk prevention organisations and bodies.

Preliminary requirements

Use of the word “**must**” within this standard means a requirement is mandatory.

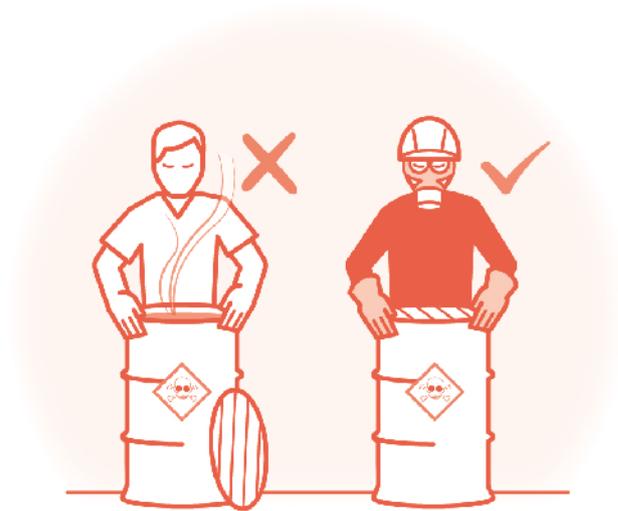
Use of the word “**should**” within this standard means the primary intent is that the requirement is mandatory but specific circumstances may mean implementation of the requirement is not reasonably practicable.



4.0.1 – Human requirements

- 1. Appropriate training** (theoretical and practical) with competent trainers must be provided for all new employees, and refreshed periodically. **Only suitably competent and qualified** persons must be involved in design, operation, maintenance and supervision of processes involving hazardous materials and chemicals.
- 2. The roles and responsibilities** of personnel involved in hazardous materials and chemicals operations must be defined clearly.
- 3. Good hygiene practices must** be respected, including regular hand washing, cleaning of the workplace or throwing away single-use equipment every time they are taken off.
- 4. Appropriate training in the correct use, storage, and maintenance of personal protective equipment (PPE) must** be provided to all employees, contractors and visitors.

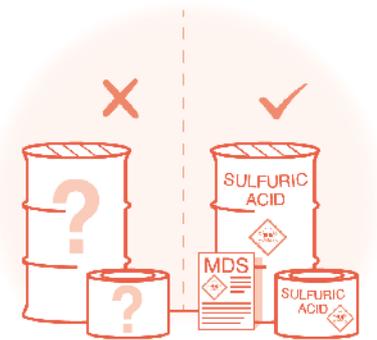
- 5. **Employees must be trained to follow** all applicable **Standard Operating Procedure (SOP)** for the management of risks associated with hazardous materials and chemicals.
- 6. **A competent person must carry out inspections and safety visits** when working close to hazardous materials and chemicals.
- 7. **Safety visits must include work behaviour observations** and any need for additional specific training must integrate the results of those observations.



THIS STANDARD APPLIES TO ALL HAZARDOUS MATERIALS AND CHEMICALS DELIVERY, STORAGE AND HANDLING WITHIN ALL VEOLIA OPERATION/FACILITIES.

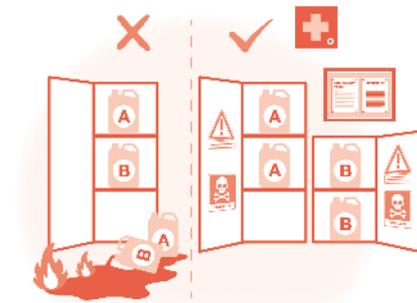
4.0.2 – Organisational requirements

1. A **documented hazardous materials and chemicals operating procedure**, establishing minimal mandatory requirements, must be developed and implemented, in accordance with the requirements of this standard. This procedure must at a minimum contain information on **how to safely perform hazardous materials and chemicals loading/unloading, as well as equipment maintenance.**



2. All must apply the **Globally Harmonized System of Classification and Labelling of Chemicals (GHS)**: labelling and placarding, as well as safety messages (symbols, pictograms, indications, etc.), must be in place on any equipment containing hazardous materials and chemicals.

3. **Documentation** related to the risk-based process in use for the initial design and/or changes performed on equipment used in storage, handling, transport, recycling and disposal of hazardous materials and chemicals must **be retained and controlled.**



4. **All facilities and equipment** in contact with hazardous materials and chemicals must be certified under local requirements with evidence of all inspections, certifications, maintenance, modifications and tests.
5. **Process documentation** for equipment in contact with hazardous materials and chemicals must be available on site and updated whenever required.
6. **All facilities and equipment** in contact with hazardous materials and chemicals must be **inspected** visually, tested and confirmed fit for purpose prior to being put into service.
7. **Preventive measures must** be taken for all facilities and equipment that come in contact with hazardous materials and chemicals.
8. **Emergency response plan must** be available for all facilities materials and chemicals where these are present.

9. An **emergency plan** must be developed and posted in areas where hazardous materials and chemicals are handled. This plan must be reviewed and tested at least annually, or after any significant change is done to its content.
10. **All hazardous materials and chemicals must be identified** (with their potential exposure work areas) in a list accessible to all workers and persons that may be exposed. This list must be updated periodically.
11. **An incompatibility chart must be available** on site to detect any possible inadvertent chemical reactions between hazardous materials and chemicals.
12. **Material Safety Data Sheet (MSDS) and waste listing must be available at all facilities using hazardous materials and chemicals and this information needs to be updated whenever required.** It needs to be readily available to any person that may be exposed to these substances, as well as emergency response services.
13. **Risk assessments** must be done using § 3.0.1 guidelines, and should be regularly updated for all workplaces in contact with hazardous materials and chemicals. Records of these assessments need to be readily available to all workers.
14. **Risk assessments** must lead to risk **control, with priority on elimination** of exposure to hazardous materials and chemicals, whenever possible. Specific measures must be taken to prevent any exposure to hazardous materials and chemicals for some categories of workers (pregnant women, trainees, etc.).
15. **A rescue team must be created at all facilities that handle hazardous materials and chemicals.**
16. Reporting and **recording of all accidents, illness, hazards and near misses** in relation with misuse of hazardous materials and chemicals must be performed, so that appropriate measures can be put in place to prevent future incidents.
17. **Health surveillance systems** must be implemented with mandatory periodic medical examinations and health follow-up examinations when appropriate, when working with hazardous materials and chemicals.
18. **A measurement program** (ambient, health surveillance) must be in place to monitor short and long-term exposure of personnel that may be exposed to hazardous materials and chemicals that have the potential to result in immediate or long-term harm.
19. **Collective protective equipment must be checked regularly and repaired or replaced whenever necessary** to ensure its continued effectiveness.
20. **Personal protective equipment (PPE)** (such as mask, gloves, glasses, etc.) must be selected to minimise risk.
21. **PPE** must be provided to all workers and replaced whenever necessary (after damage or in case of malfunction).
22. **PPE** must be stored in a clean place, checked regularly; it is easily accessible when needed.



4.0.3 – Technical requirements

- 1. Pipes and vessels containing hazardous materials and chemicals** must be clearly labelled so the chemical can be easily identified. Direction of flow within the pipes must also be indicated.
- 2. Draining valves, pressure relief devices and drip trays** must be installed and available in the workplace to allow interventions of maintenance tasks in complete safety for operational units where hazardous materials and chemicals are present or may be present.
- 3. All facilities and equipment** handling hazardous materials and chemicals must be designed to prevent worker exposure (achieved through materials and chemicals compliance, containment, physical separation, mechanical ventilation, etc.).
- 4. The risk of misuse and abuse** of hazardous materials and chemicals must be **minimised** by adapting the equipment and facilities.
- 5. All facilities and equipment** in contact with hazardous materials and chemicals must be in a **serviceable condition, well lit**, and is kept at **clean at all times**.
- 6. All hazardous materials and chemicals** must be stored in limited stock levels, dependent on the frequency of use of the chemical. They must be stored on retentions.
- 7. The hazardous materials and chemicals** must be handled, stored or used **in a closed system** (double-walled tanks, etc.) with strengthened requirements for carcinogenic, mutagenic, reprotoxic (CMR) substances.
- 8. Security and access control systems** must be in place to adequately manage access to areas where hazardous materials and chemicals are stored and used (implementation of restricted areas, etc.).
- 9.** Work areas where hazardous materials and chemicals are present must be **be identified and well indicated** (e.g., warning signs).
- 10.** Work areas where hazardous materials and chemicals are present must be **equipped with warning systems** (e.g., gas/liquid detector checked regularly).
- 11.** Work areas where hazardous materials and chemicals are present must have **clearly marked and easily accessible emergency exits**.
- 12.** **Work areas** where hazardous materials and chemicals are present must be **made easily available to emergency and fire services**.
- 13.** **Work areas where hazardous materials and chemicals are present** must have **emergency systems** in place (e.g., eyewashes, safety showers, etc.). These systems need to be checked regularly and documented where any operation involving handling of hazardous materials and chemicals takes place.

5.0 > Glossary

Acute Toxicity: Chemicals can be allocated to one of five toxicity categories based on acute toxicity by the oral, dermal or inhalation route according to LD50 (oral, dermal) or LC50 (inhalation) values. (Ref.: GHS)

Carcinogen: Any chemical substance or a mixture of chemical substances which induce cancer or increase its incidence. (Ref.: GHS)

Competent Person: A person who has acquired the knowledge and skills to carry out the task through training or experience. Competency is a combination of these attributes that enables a worker to identify both the risks arising from a situation and the measures needed to deal with them.

Controlled Hazard: A hazard is “controlled” when the hazard still exists but the potential exposure to the hazard is controlled through means such as personal protective equipment, fall arrest systems, ventilation, work practices, cooling vests, etc.

Corrosive: It is a substance or a mixture which by chemical action will produce irreversible damage of the skin or tissue damage in the eye.

Eliminated Hazard: A Hazard is “eliminated” when the hazard is removed.

Equipment: Material (supplies or tools) designed, manufactured and used for its intended purpose during operation.

Explosive: Explosive substance means a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases. (Ref.: GHS)

Exposure: Describes a person coming into contact with a chemical that is a “physical” or “health” hazard (see definitions below). This contact in terms of health hazards includes any route of entry (e.g., inhalation, ingestion, skin contact or absorption.).

Facilities: Anything that is provided for a particular purpose.

Flammables: Flammable gas means a gas having a flammable range with air at 20°C and a standard pressure of 101.3 kPa. Flammable liquid means a liquid having a flash point of not more than 93°C. Flammable solid means a solid which is readily combustible, or may cause or contribute to fire through friction. (Ref.: GHS)

Gases under pressure: Gases are classified, according to their physical state when packaged, into one of four groups as follows: compressed gases (entirely gaseous at -50°C; including all gases with a critical temperature < -50°C), liquefied gases (partially liquid at temperatures above -50°C), refrigerated liquefied gases (partially liquid because of their low temperature), dissolved gases (dissolved in a liquid phase solvent). (Ref.: GHS)



Harmful (Irritant): Harmful substance or mixture may induce a hypersensitivity of the airways, an allergic response following skin contact, serious eye damage. Irritation means the production of reversible damage to the skin or changes in the eye, which are fully reversible within 21 days of application. (Ref.: GHS)

Hazard: Hazard is possible source of damage, harm or adverse health effects.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment or ability to self-rescue, injury, or acute illness.

Health Hazard: A chemical for which there is evidence that acute or chronic health effects may occur in exposed staffs. The term “health hazard” includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system (formation of blood cellular components), and agents which damage the lungs, skin, eyes, or mucous membranes.

Material Safety Data Sheet (MSDS): Written or printed material concerning all chemicals (including hazardous) which is prepared in accordance with standards and regulations and should describe the chemical and physical properties of a material and provide advice on safe handling of that material.

Mixture: Any combination of two or more substances if the combination is not, in whole or in part, the result of a chemical reaction.

Mutagenicity: Mutagen means an agent giving rise to an increased occurrence of mutations in populations of cells and/or organisms. (Ref.: GHS)

Oxidizers: Oxidizing gas means any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. Oxidizing liquid means a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. Oxidizing solid means a solid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. (Ref.: GHS)

Personal Protective Equipment (PPE): Safety equipment designed and distributed for protecting workers from injury in the course of their work. E.g., eye protection, gloves, hard hat, work boots, etc. The minimal PPE to be provided is determined by the MSDS for specific products.

Qualified Person: One who is **BOTH** competent **AND** in possession of a recognized degree, certificate, or professional standing.

Reproductive Toxicity: Effects on reproductive ability or capacity, and on developmental toxicity in unborn children. (Ref.: GHS)

Rescue Team: The personnel designated to rescue employees from hazard.

Risk: The chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment loss. (CCOHS).

Risk Assessment: Process of evaluation of the risk arising from a hazard, taking into account the adequacy of any existing control and deciding whether or not the risk is acceptable. (Ref.: OHSAS 18001: 2007)

Substance: A substance of matter which has a specific composition and specific physical characteristics.

Waste: Materials and chemicals that are not prime products (that is products produced for the market) for which the generators has no further use in terms of their own purposes of production, transformation or consumption, and of which they want to dispose. (OECD)

Work area: Any physical location in which work-related activities are performed under the control of Veolia. (Ref.: OHSAS 18001: 2007)





APPENDIX 1 > Applicability and compliance assessment

> REQUIREMENTS	C	NC
HUMAN		
1. Appropriate training (theoretical and practical) with competent trainers must be provided for all new employees, and refreshed periodically. Only suitably competent and qualified persons must be involved in design, operation, maintenance and supervision of processes involving hazardous materials and chemicals.		
2. The roles and responsibilities of personnel involved in hazardous materials and chemicals operations must be defined clearly.		
3. Good hygiene practices must be respected.		
4. Appropriate training in the correct use, storage, and maintenance of personal protective equipment (PPE) must be provided to all employees, contractors and visitors.		
5. Employees must be trained to follow all applicable Standard Operating Procedures (SOP) for the management of risks associated with hazardous materials and chemicals.		
6. A competent person must carry out inspections and safety visits when working close to hazardous materials and chemicals.		
7. Safety visits must include work behaviour observations and any need for additional specific training must integrate the results of those observations.		
ORGANISATIONAL		
1. A documented hazardous materials and chemicals operating procedure , establishing minimal mandatory requirements, must be developed and implemented, in accordance with the requirements of this standard. This procedure must at a minimum contain information on how to safely perform hazardous materials and chemicals loading/unloading, as well as equipment maintenance .		
2. All must apply the Globally Harmonized System of Classification and Labelling of Chemicals (GHS): labelling and placarding, as well as safety messages (symbols, pictograms, indications, etc.), must be in place on any equipment containing hazardous materials and chemicals.		
3. Documentation related to the risk-based process in use for the initial design and/or changes performed on equipment used in storage, handling, transport, recycling and disposal of hazardous materials and chemicals/substances must be retained and controlled .		

<p>4. Process documentation for equipment in contact with hazardous materials and chemicals must be available on site and updated whenever required.</p>		
<p>5. All facilities and equipment in contact with hazardous materials and chemicals must be certified where required.</p>		
<p>6. All facilities and equipment in contact with hazardous materials and chemicals must be inspected visually, tested and confirmed fit for purpose prior to being put into service.</p>		
<p>7. Preventive measures must be taken for all facilities and equipment in contact with hazardous materials and chemicals.</p>		
<p>8. An emergency response plan must be available for all facilities and equipment in contact with hazardous materials and chemicals.</p>		
<p>9. An emergency plan must be developed and posted in areas where hazardous materials and chemicals are handled. This plan must be reviewed and tested at least annually or after any significant change is done to its content.</p>		
<p>10. All hazardous materials and chemicals must be identified (with their potential exposure work areas) in the list accessible to all employees and persons that may be exposed, and periodically updated.</p>		
<p>11. Incompatibility chart must be available on site to detect any possible inadvertent chemical reactions between hazardous materials and chemicals.</p>		
<p>12. Material Safety Data Sheet (MSDS) and waste listing must be available on all facilities using hazardous materials and chemicals, and this information needs to be updated whenever required. It needs to be readily available to any persons that may be exposed to these substances, as well as emergency response services.</p>		
<p>13. Risk assessment must be done using § 3.0.1 guidelines, and regularly updated for all workplace in contact with hazardous materials and chemicals. Records of these assessments need to be readily available to all workers.</p>		
<p>14. Risk assessments must lead to risk control, with priority on elimination of exposure to hazardous materials and chemicals, whenever possible. Specific measures must be taken to prevent any exposure to hazardous materials and chemicals for some categories of workers (pregnant women, trainees, etc.).</p>		
<p>15. A rescue team must be created at all facilities that handle hazardous materials and chemicals.</p>		
<p>16. Registration of all accidents, illness and near misses in relation with misuse of hazardous materials and chemicals must be performed, so that appropriate measures can be issued to prevent future incidents.</p>		





➤ REQUIREMENTS	C	NC
ORGANISATIONAL		
17. Health surveillance systems must be implemented with mandatory periodic medical examinations and health follow-up examinations.		
18. A measurement program (ambient, health surveillance) must be in place to monitor short and long-term exposure of personnel.		
19. Collective protective equipment must be checked regularly, and repaired or replaced whenever necessary.		
20. Personal protective equipment (PPE) (such as mask, gloves, glasses, etc.) must be provided to all affected employees and replaced, whenever necessary.		
21. PPE must be stored in a clean place, checked regularly, and it is easily accessible when needed.		
TECHNICAL		
1. Pipes and vessels containing hazardous materials and chemicals must be clearly labelled so their content can be easily identified. Direction of flow within the pipes must also be identified.		
2. Draining valves, pressure relief devices and drip tray must be installed and available in the workplace to allow interventions of maintenance tasks in complete safety for operational units where hazardous materials and chemicals are present or may be present.		
3. All facilities and equipment handling hazardous materials and chemicals must be designed to prevent accidental exposure to workers.		
4. The risk of misuse and abuse of hazardous materials and chemicals must be minimized by adapting the equipment and facilities.		
5. All facilities and equipment in contact with hazardous materials and chemicals must be in a serviceable condition well lit, and kept clean at all times.		
6. All hazardous materials and chemicals must be stored in limited stock levels, dependent on the frequency of use of the chemical.		
7. The hazardous materials and chemicals must be handled, stored or used in a closed system (double-walled tanks, etc.) with strengthened requirements for carcinogenic, mutagenic, reprotoxic (CMR) substances.		
8. Security and access control systems must be in place to adequately manage access to areas where hazardous materials and chemicals are stored and used.		



<p>9. Work areas where hazardous materials and chemicals are present must be identified and well indicated (e.g., warning signs).</p>		
<p>10. Work areas where hazardous materials and chemicals are present must be equipped with warning systems (e.g., gas/liquid detector checked regularly).</p>		
<p>11. Work areas where hazardous materials and chemicals are present must have clearly marked and easily accessible emergency exits.</p>		
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