

Principles of Chemical Management in the Textile and Garment Industries in Bangladesh

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

Structure – Overall

Part 1	Part 2	Part 3
<ul style="list-style-type: none">▪ Foreword▪ Preface▪ General provisions▪ Objective▪ Scope of the guideline▪ Vision▪ Mission/objective▪ Definitions	<p>10 Technical Chapters Covering</p> <ol style="list-style-type: none">1. Good chemical management practices2. Using reliable information sources on chemical substances and mixtures3. Identifying and assessing chemical hazards and risks4. Selecting and purchasing chemicals with consideration of sustainability aspects5. Managing and controlling chemicals risks6. Ensuring safe storage and transport of chemicals7. Preparing and responding to chemical emergencies8. Managing chemical waste and residues9. Establishing chemical management system and organisational structure10. Other (e.g. chemical security)	<ul style="list-style-type: none">▪ Annexes▪ Glossary/Index

5. Managing and controlling chemicals risks

5.1 Substitution of hazardous substances

5.2 Elimination of hazardous substances

5.3 Using measures for controlling chemical hazardous to health

5.4 Control measures for flammable, dangerously reactive or explosive chemicals

5.5 In-process measures for reducing environmental impact of chemicals

5. Managing and controlling chemicals risks

5.1 Substitution of hazardous substances

5.1.1 While retaining performance and economic feasibility, **chemicals of concern** should be replaced with safer alternatives. However, in order to avoid regretful substitutes, the proposed alternative must be assessed scientifically and transparently. The following steps are suggested for chemical alternative assessment.

5.1.2 **Identification of Hazards and Properties:** The risks, functions, and performance characteristics of the chemical that will be substituted should be defined. It should be examined whether a substitution could necessitate a change in application circumstances, such as pH, temperature, or equipment.

5.1.3 **Setting the Substitution Criteria:** The criteria for excluding substitutes that aren't as safe or as safe as the original should be described. The public databases should be used to create a list of **compounds of concern or those on regulatory 'blacklists'**.

5.1.4 **Searching for Alternatives:** The company should look for alternatives that have already been adopted using different sources.

5. Managing and controlling chemicals risks

5.1 Substitution of hazardous substances

5.1.5 Comparing Alternatives: All alternatives should be evaluated using the same procedure and the same substitution criteria. There are many tools available for comparing alternatives such as the Column Model developed by the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA). Other resources include, but not limited to Greenscreen, SUBSPORT, or Toxics Use Reduction Institute (TURI).

5.1.6. Pilot Trials: On a small-scale trial, the safer option should be tested and the adjustments needed to the process and equipment should be implemented. The performance, quality, and impact on employees should be examined. It should be checked if there are any potential concerns in other areas.

5.1.7 Implementation in Bulk: Pilot trials should be scaled up for implementation in production. During installation, any changes in risk or performance should be kept track of. Input from stakeholders should be collected and adjustments should be made as needed.

5. Managing and controlling chemicals risks

5.2 Elimination of hazardous substances

5.2.1 The employer should conduct an assessment of whether **the risk of hazardous chemicals** can be eliminated by

- (a) ceasing the use of the specific hazardous chemicals
- (b) using alternate processes.

5.2.2 For the identification of substitute substances, the employer shall consult with chemical manufacturers/suppliers (**e.g., positive lists**) and refer to recommendations on alternative substances (e.g., ZDHC alternative fact sheet etc.).

5.2.3 The employer shall take care to consider all known risks of the proposed substitute chemicals and take action on precautionary measures before substitution.

5.2.4 The employer shall prove the commitment to the elimination of all hazardous chemicals (e.g. by statement in chemical policy) and to draw up **specific time-bound action** planned to the elimination of all hazardous chemicals as specified in the national legislation or as per international supply chain requirements.

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

5.3.1 The employer should make sure that all workers are **protected against the risk of injury or diseases** from chemicals hazardous to health.

5.3.2 Worker should not be exposed to chemicals hazardous to health, in particular to an extent which **exceeds exposure limits or other exposure criteria** for the evaluation and control of the working environment established by the national authority (e.g., DIFE, DoE)

5.3.3 The control measures to provide protection for workers could be any combination of the measures outlines the following sections.

- Use of good design and installation practices and engineering controls
- Use of safe work systems and practices
- Use of personal protective and hygiene measures
- Cleaning and maintenance of personal protective equipment and clothing
- Welfare facilities and personal hygiene measures

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of good design and installation practices and engineering controls

5.3.4 The basic principle of the installation practices and engineering controls is to isolate people from the hazardous chemicals or reduce exposure to them. For this purpose, the factory should consider applying the following control measures:

- a. Using totally enclosed process and handling systems
- b. Segregating hazardous process from the operators or from other processes
- c. Using plant process or work systems which minimize generation of, or suppress or contain hazardous dust, fumes, vapors and which limit the area of contamination in the event of spills leaks or accidental releases
- d. Installing and using particular enclosure, with local exhaust ventilation (LEV) connected to ducting systems which guide the exhaust air away from the work area and/or to a collection or treatment device (e.g., air scrubber)
- e. Providing **sufficient general ventilation (engineered and natural)** to ensure proper air change ratios in work areas to prevent built-up of contamination in the air. Refer to the national regulation regarding required or recommended air change ratios.

5.3.5 Factory shall ensure good installation practices and engineering controls in line with section 8 of GHS compliant SDS and the technical data sheets and guidance by chemical suppliers.

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of safe work systems and practices

5.3.9 In support of the aforementioned engineering controls, factory shall implement administrative control measures to reduce the number of workers exposed and manage their way of working with chemicals.

5.3.10 These measures shall be related to changes in work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations.

5.3.11 Administrative controls should include but are not limited to;

- a) **Reducing the number of workers exposed and limiting access** to non-essential areas or areas with hazardous substances present or being used (e.g., preventing unauthorized access to chemical stores, chemical mixing areas, chemical waste handling and treatment areas, laboratories)
- b) **Restricting the task** to workers only who are **proven to be competent or qualified** to perform the work.
- c) Reducing the period of exposure of workers by rotating workers between tasks and/or specifying extended periods of breaks over a workday.

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of safe work systems and practices

- d) Reassigning **female pregnant workers** to tasks or work areas not involving handling of hazardous chemicals
- e) Ensuring regular cleaning of contaminated walls, surfaces etc.
- f) Limiting the quantities of hazardous chemical products stored and the provision of segregated storage areas for hazardous chemicals
- g) Conducting regular training and providing instructions to workers on hazards and safe handling of chemical products, understanding and reading labels and hazard symbols, spill management procedures, and/or PPE use and create awareness about the hazard of chemicals.
- h) Creating awareness about chemical hazards and good work practices (e.g., chemical safety posters, work instructions, warning signs)

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of personal protective and hygiene measures

5.3.12 If **engineering control and administrative controls are not enough**, the factory shall provide suitable personal protection equipment (PPE) in line with section 8 of the GHS aligned standard SDS to eliminate or minimize risk or threat to health.

5.3.13 PPEs shall be used for protection against accidents and incidents that may occur despite appropriate exposure control systems and operational procedures.

5.3.14 **PPE shall be selected based on hazard/risk assessment** that identifies the specific chemical or physical hazards associated with the specific work tasks

5.3.15 **A designated person shall be selected and put in charge of maintaining a proper inventory of PPE and map locations/processes/tasks requiring the use of PPE**

5.3.16 The employer shall make sure that the selected PPE is suitable for its purpose and fits the workers. For this purpose, PPE should be made available in different sizes.

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of personal protective and hygiene measures

5.3.17 The employer shall also make sure that a sufficient supply of PPE is readily available for the workers.

5.3.18 The employer shall provide the workers with adequate instructions about the proper use of PPE in the workplace.

5.3.19 Factory shall provide **training to the new workers about PPE** before joining at the workplace. And training shall also be provided to the regular workers for new chemicals or processes applied at the factory. Records of such training must be maintained.

5.3.20 Amongst others, the training on PPE may cover the following topics:

- a. When and how to use PPE
- b. How to take care of PPE after every use
- c. How to clean and maintain personal protective equipment and clothing properly
- d. Where and how to store it safely to prevent contamination
- e. How to check PPE for its functionality and based on the calculation of the time interval where the PPE is being exposed
- f. How to dispose of PPE after use

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Use of personal protective and hygiene measures

5.3.21 The factory shall provide supervision to ensure that the PPE is properly used. Managers and supervisors should adhere to the same PPE use requirements when they are exposed to the specific workplace risk that requires the PPE's use for protection.

5.3.22 The factory shall make sure that any outside persons (e.g. visitors, inspectors, contractors) are briefed on the need for PPE beforehand.

5.3.23 Standard PPE signage shall be used as a vital communication tool in areas where handling chemicals takes place to inform workers and outside persons to use the right PPE.

5.3.24 All PPE that is necessary for safety in the use of chemicals should be provided and maintained by the employer without cost to the worker

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Cleaning and maintenance of personal protective equipment and clothing

5.3.27 **PPE shall not be used longer than the time indicated by the producer.** It is recommended that the employer maintains a PPE replacement schedule for planning the supply of PPE and communicated the same to the designated supervisory personnel to track and monitor.

5.3.28 **Respiratory protective equipment, other than one-shift disposable respirators, should be cleaned, disinfected and examined after each use.**

5.3.29 The factory shall keep a record of the cleaning, disinfecting and examination of such respiratory protective equipment, and of its conditions and any defect, in accordance with national law or good practices.

5.3.30 The employer shall provide for the laundering, cleaning, disinfection and examination of protective clothing or equipment which have been used and may be contaminated by chemicals hazardous to health.

5.3.31 Factory should prohibit any PPEs or protective clothing that is contaminated and hazardous to health for further laundering, cleaning or keeping at workers' homes.

5. Managing and controlling chemicals risks

5.3 Using measures for controlling chemical hazardous to health

Welfare facilities and personal hygiene measures

5.3.32 Adequate washing facilities shall be provided to enable workers to meet standards of personal hygiene consistent with the adequate control of exposure and need to avoid the spread of chemicals hazardous to health.

5.3.33 The washing facilities should be conveniently accessible but situated so that they do not themselves become contaminated from the workplace.

5.3.34 The type of washing facilities should be related to the nature and degree of exposure.

5.3.35 Changing facilities shall also be situated and designed to prevent the spread of contamination from protective clothing to personal clothing and from one facility to another.

5.3.36 To reduce the risk of ingesting chemicals hazardous to health, workers shall not eat, chew, drink or smoke in any work area which is contaminated by such chemicals. This shall be communicated as part of safety training, work instructions and appropriate signages.

5. Managing and controlling chemicals risks

5.4 Control measures for flammable, dangerously reactive or explosive chemicals

5.4.1 Good design and installation practice

5.4.2 Use of safe work systems and practices

5.4.3 In-process measures for reducing the environmental impact of chemicals

5. Managing and controlling chemicals risks

5.4 Control measures for flammable, dangerously reactive or explosive chemicals

5.4.1. Good design and installation practice

5.4.1.1. The prevention of fire is the core principle of fire management and the factory shall perform the following steps to prevent fire incidents:

- **Ventilation of areas with flammable substance** to reduce possible accumulation of dangerous concentrations
- **Removal of possible ignition sources** like sparks, flames, burning tobacco or hot surfaces.
- **Assignment of hazard zones** with flammable chemicals using labels with warning signs.
- Substitution or elimination of flammable chemicals
- **Containment** (flammable substances shall be kept in suitable containers)
- Segregation of incompatible chemicals according to the compatibility chart with walls, floors, shelves, and fittings made of suitable materials
- Storage of containers with flammable chemicals **away from doors** keeping the flammable chemical storage area dry, cool, out of direct sunlight, and away from steam pipes, boilers or other heat sources.

5.4.1.2 In case of managing flammable chemicals factory shall at all times:

- Allow only trained, authorized people into storage areas
 - Keep the amount of flammable chemicals in storage as small as possible.
 - Inspect storage areas regularly for any deficiencies including damaged or leaking containers and poor housekeeping.
 - Correct all deficiencies as soon as possible.

5. Managing and controlling chemicals risks

5.4 Control measures for flammable, dangerously reactive or explosive chemicals

5.4.2. Use of safe work systems and practices

5.4.2.1 Where practicable, the weighed powder like chemicals shall be mixed manually with water to a slurry or paste before transfer to the mixing tank to avoid the creation of dust clouds.

5.4.2.2 **Flammable chemicals shall be removed from the storage area during maintenance work** (e.g. welding).

5.4.2.3 Factory shall ensure the handling of flammable chemicals in a dry and chemically inert atmosphere where adequate ventilation is provided.

5.4.2.4 Factory shall identify the areas where hazardous explosive atmospheres may occur and classify into zones based on their likelihood and persistence. This is known as *Hazardous Area Classification*.

The zone classifications are:

- Zone 0: That part of a hazardous area in which an explosive atmosphere is continuously present, or present for long periods, or frequently.
- Zone 1: That part of a hazardous area in which an explosive atmosphere is likely to occur occasionally in normal operation.
- Zone 2; That part of a hazardous area in which an explosive atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

5. Managing and controlling chemicals risks

5.5 In-process measures for reducing environmental impact of chemicals

5.5.1 Before disposing of a reagent grade chemical, the factory shall determine if someone else requires the chemical.

5.5.2 Factory shall establish **chemical use parameters** before placing an order. This will minimize waste by purchasing chemicals in the container size that permits maximum consumption.

5.5.3 Factory shall avoid stockpiling of common chemicals.

5.5.4 Factory shall replace faulty or damaged caps and lids of chemical containers at the storage. This will safeguard against the effects of air and moisture contamination.

5.5.5 **Factory can use automatic and semi-automatic weighing, dissolving**, measuring and dispensing systems for precise delivery of textile chemicals and dyestuffs to the production machines.

5.5.6 Factories shall adapt the best available techniques (BATs) that control chemical consumption, require low-liquor ratio application, enable liquid removal and recovery in processes.

5.5.7 Factory shall substitute hazardous chemicals with less-hazardous ones and use available alternative chemicals for the hazardous ones.

5. Managing and controlling chemicals risks

5.5 In-process measures for reducing environmental impact of chemicals

5.5.8 **Factory shall adapt best available techniques that can enable factories to reuse process chemicals.** Like using Cyclodextrins (CD) to encapsulate the direct dyes contained in the wastewater to recover and reuse them.

5.5.9 Factories shall also ensure the application of sectoral benchmarking on a regular basis in their process.

5.5.10 A Standard Operating Procedures (SOP) for maintenance of machineries and housekeeping must be adapted by the factory which shall incorporate procedures for:

- a) Identification of machinery, components and equipment not performing at optimum
- b) operating conditions and a record of this maintained
- c) Planned replacement of machinery, components, PPE, equipment, First-Aid box components, spill kits and stores materials as per their expiry date
- d) Maintaining machinery and equipment servicing records
- e) Determining chemical containers in poor condition or without labels or expired
- f) Chemical clean-out and safe disposal of unused, rejected chemical products
- g) Regular review of emergency response measures such as eyewash and body
- h) showers, exit signs, assembly points, exit pathways, fire safety and First-Aid boxes

**Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH**

Registered offices
Bonn and Eschborn

Employment Injury Protection Scheme for Workers in
the Textile and Leather Industries (EIPS)

GIZ Bangladesh

PO Box 6091, Gulshan 1

Dhaka 1212, Bangladesh

T +880 2 5506 8744-52, +880 9666 701 000

F +880 2 5506 8753

E giz-Bangladesh@giz.de

I www.giz.de/bangladesh