Principles of Chemical Management in the Textile and Garments Industry in Bangladesh

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

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FABRIC Asia

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Module 6:

Ensuring safe storage and transport of chemicals

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6.1 Applying good chemical storage practices

6.2 Applying practices in onsite and offsite transport of chemicals and chemical waste

Module 6: Ensuring safe storage and transport of chemicals

6.1 Applying good chemical storage practices

6.1.1. Hazardous chemicals should be stored under conditions specific to their inherent properties and characteristics to ensure safety. Chemicals with typical properties and characteristics that are relevant include:

a. flammable liquids;

b. flammable gases;

c. toxic chemicals;

d. corrosive chemicals;

e. chemicals that emit highly toxic fumes in the event of a fire;

f. chemicals which, in contact with water, give off flammable gas;

g. oxidising chemicals;

h. explosives;

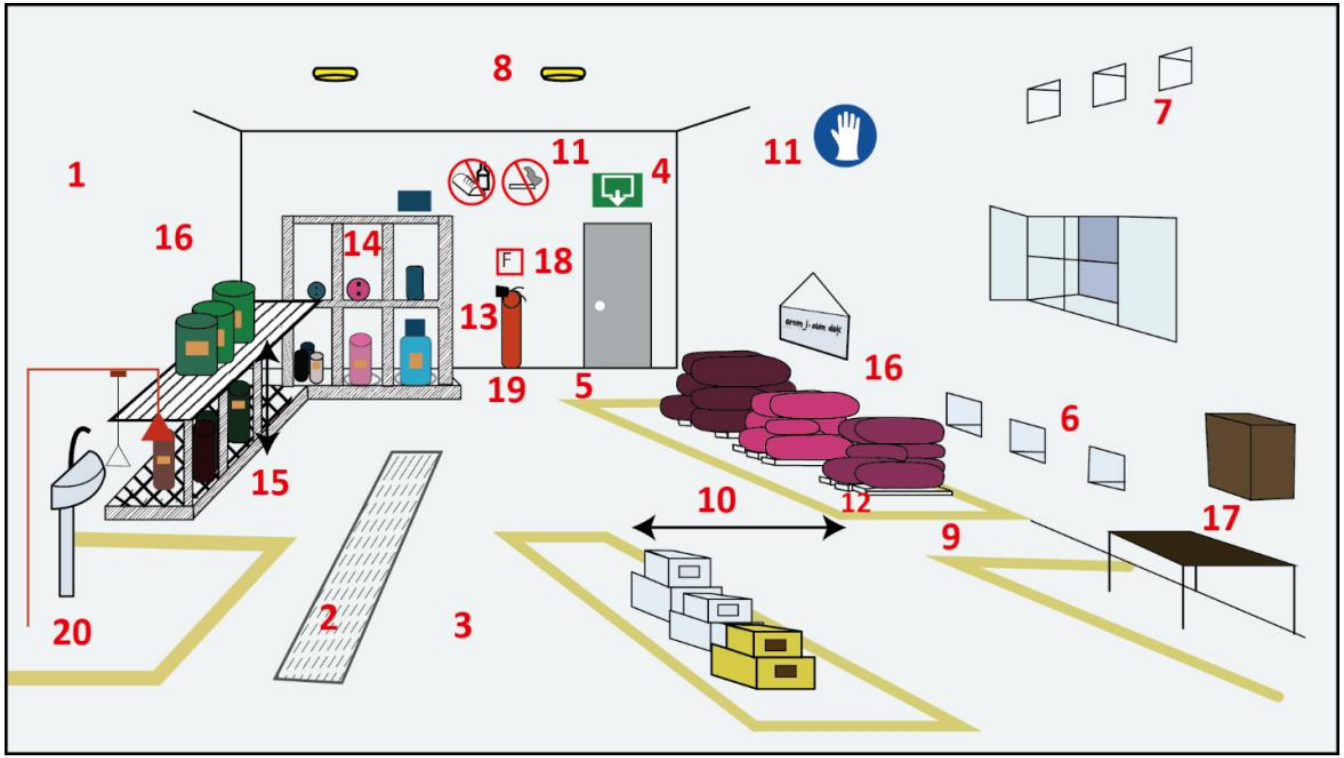
i. unstable chemicals;

j. flammable solids;

k. compressed gases

Module 6: Ensuring safe storage and transport of chemicals

6.1 Applying good chemical storage practices



Module 6: Ensuring safe storage and transport of chemicals

6.1 Applying good chemical storage practices

6.1.2. It is recommended that the chemical store is physically separated from production areas, occupied buildings. Other storage areas (*e.g.* raw material, semi-finished, finished products), workshops or areas with potential sources of ignition (*e.g.* generator, boiler, electrical transformers, and control panels). The location should be selected in such a way that the store may not be subjected to flooding. (1)

6.1.3 The floor of the chemical store should be flat to allow easy handling of chemical containers with trolleys, forklifts; and non-permeable to prevent contamination of soil and groundwater. Outside ramp is recommended for the elevated storage location, and mezzanine floors (2) should be provided with a hoisting arrangement to avoid manual handling (3).

6.1.4. The storage should have separate unobstructed and clearly marked (4) emergency exits. The main doors should be lockable and unauthorized personnel must be prevented from entering the chemical store. In addition, signboards should be placed outside the entrances, clearly marking the building or areas as chemical stores and prohibiting unauthorized entry (5).

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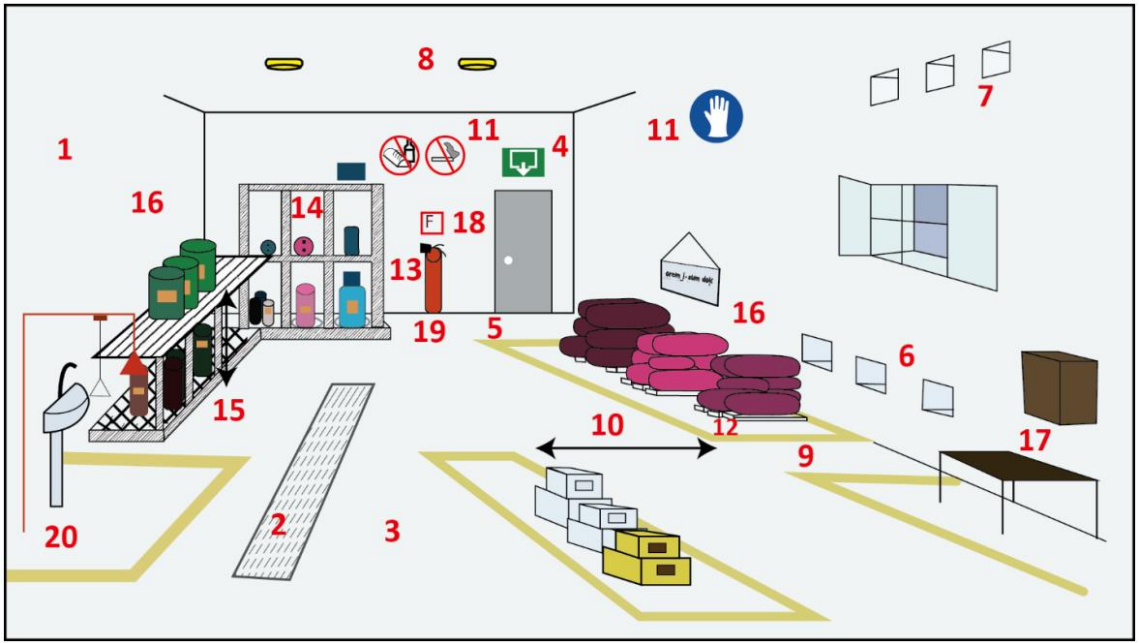
6.1 Applying good chemical storage practices



6. Ensuring safe storage and transport of chemicals

6.1 Applying good chemical storage practices

6.1.5. Adequate exhaust vents at floor and ceiling level should be available to maintain temperature and humidity and to allow possible air contaminants (heavy and light vapours, dust) to be removed from the storage area (6,7).

6.1.6. Electrical installation (8) inside the chemical store (e.g. switches, panels, light fittings, cables) should be insulated and be "explosion-proof". Ideally, switches are placed outside the chemical store.

6.1.7. Different areas are clearly designated for the storage of the different chemicals (9). The designated storage areas should be separated (10) from each other to allow for easy movement of personnel and movement devices (e.g. trolley, forklift). These passageways and aisles should be marked. Recommended width of passageways/aisles: 0.8 meters (about 2 feet) for persons, 2 meters (6 feet) for trolleys and forklifts.

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6.1.8. There should be adequate precautionary and warning signs in the chemical store to create awareness and provide guidance on preventive (*e.g.* no smoking, not eating, no open flames) and precautionary measures (*e.g.* type of PPE to be worn) (11).

6.1.9. Powdered chemicals stored in bags should not be stored on the floor directly to protect against ground humidity. Placement on pallets (12) will allow for easy movement of chemicals with trolleys or forklifts.

6.1.10. Containers with liquid chemicals (for any with more than 5 litres) should be kept in catch-pits (trays) and/or areas with structural secondary containments. If not otherwise regulated, such secondary containment system should have sufficient capacity to contain at least 100% of the volume of the largest container stored (13)

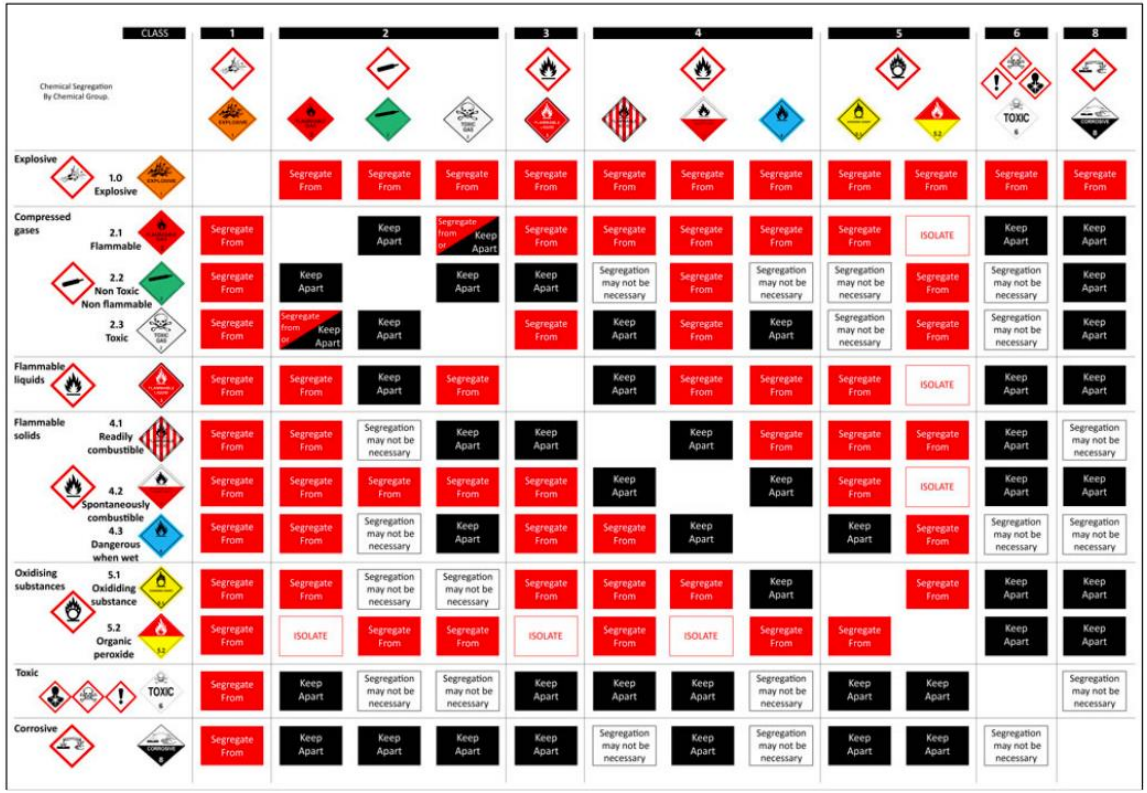
Module 6: Ensuring safe storage and transport of chemicals

6.1 Applying good chemical storage practices

6.1.11. In earthquake prone areas, shelves should have raised edges or rim guards (minimum height 5 cm) to prevent containers from falling off the shelves. Cords can be used for added security.

6.1.12. Accidental contact between incompatible chemicals can result in fire, explosion and/or formation of highly toxic or otherwise dangerous mixtures. Therefore, such contact has to be prevented through segregation (14), either by storing in separate areas or by structural separation (e.g. divider walls, separate storage area). A chemical segregation chart can be used. By comparing labels or hazard classes as per GHS, for two types of chemicals, the compatibility can be identified in the matrix. For example, Isolate chemicals, keep separate from, keep apart from or maybe kept together

Chemical segregation chart



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6.1 Applying good chemical storage practices

6.1.13. Another type of segregation chart from Technical rules TRGS 510 by the German Federal Institute for Occupational Safety and Health on storage of hazardous substances can be referred for clustering of different hazardous chemicals as shown below. The following steps should be followed to use the chart:

- Check safety data sheet for respective information to identify the storage classes of the substances in hand
- Consult the chart for information on compatibility
- In yellow boxes, refer to the technical rules (TRGS 510) for specific further guidance in the respective subsections indicated by the number in the yellow box.

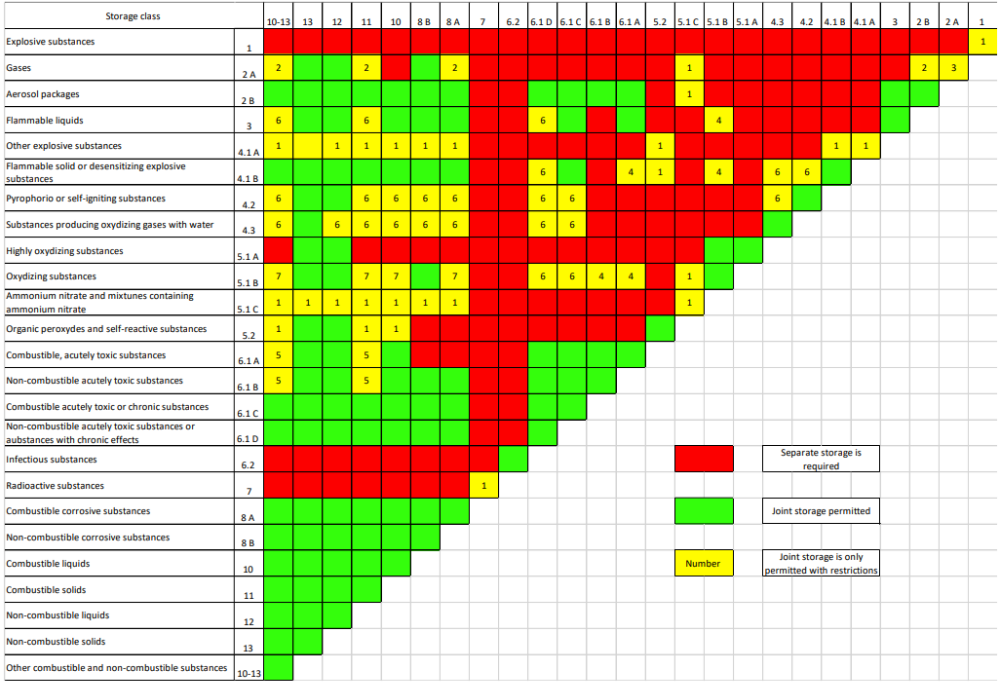

Figure 7 Joint storage table according to storage class (Source: TRGS 510, BAUA, Germany)

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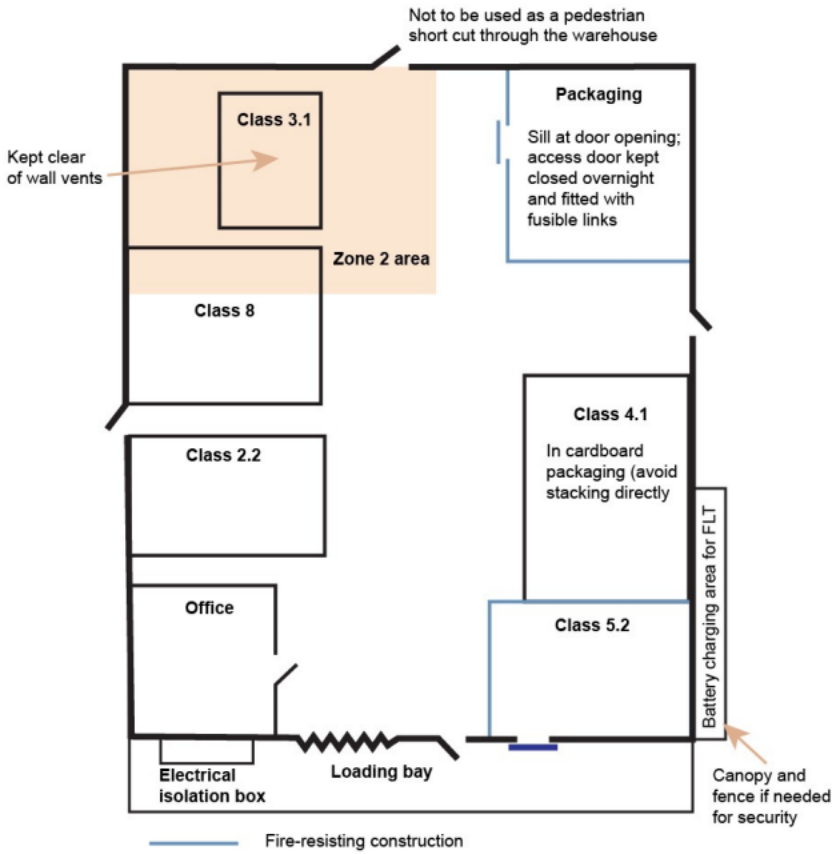
6.1 Applying good chemical storage practices

6.1.14. When chemicals are stored on racks and shelves, it is vital to ensure that the quantity stored does not exceed the recommended structural capacity of the shelves and racks. Heavier chemical containers, particularly those containing liquid chemicals, should be stored at the floor level, and the lighter ones can be stored on higher shelves (15). Storage cabinets, if in use, are of approved quality, lockable and clearly labelled with the hazard class of the chemicals.

6.1.15. Each chemical container should clearly be labelled, while each designated chemical storage area should also be labelled, indicating at least one type of chemical family and hazards classification (16). Storage class can be found in the safety data sheet.

6.1.16. No chemicals containers should be stored outside the designated areas or in designated passageways. The chemical containers should be kept closed all the time other than dispensing a chemical.

An example of Storage layout plan



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6.1 Applying good chemical storage practices

6.1.17. Reference information of all chemicals stored (*e.g.* a set of safety data sheets) are kept for ready reference in the chemical store. In an emergency, these provide valuable and often lifesaving information to emergency personnel (first aid, doctor, firefighter) (17).

6.1.18. Fire extinguisher, suitable for the type of chemicals stored, should be kept ready in easily and clearly marked locations. In addition, suitable fire extinguishers should be placed outside the chemical store as well (18,19).

6.1.19. Apart from first aid box, a washing factory, eye/face rinsing station or safety shower should be available in or near the chemical store for personal hygiene (after handling chemicals) and emergencies (17, 20)

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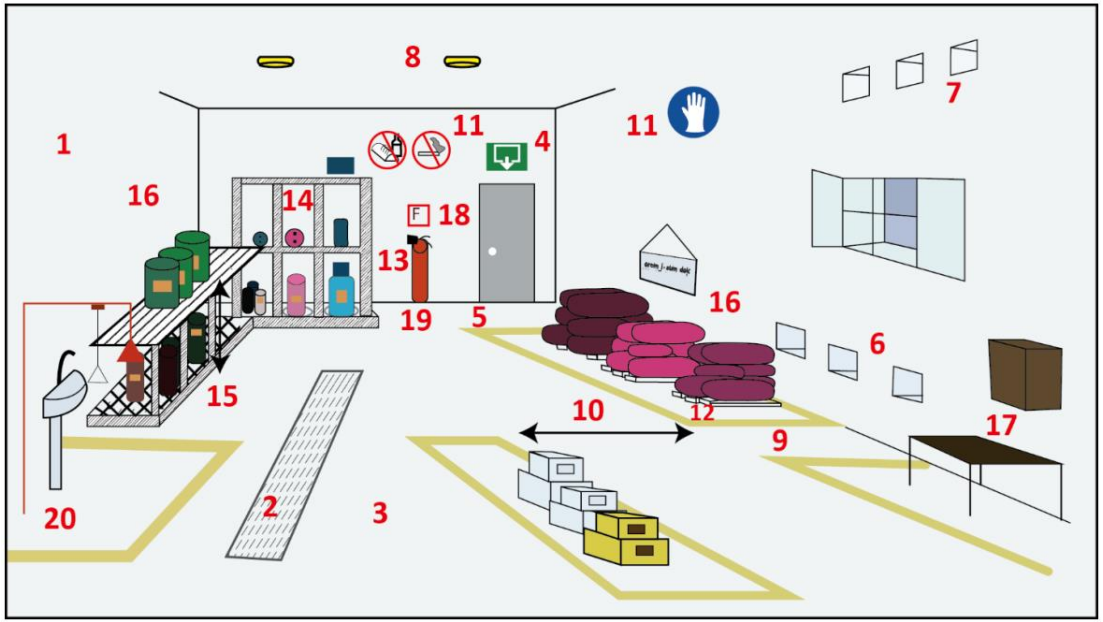

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6.1 Applying good chemical storage practices

6.1.20. Spill control material (absorbent material, waste receptacles, emergency personal protective equipment) should be kept available and should be selected as per the recommendations in the safety data sheets. Any spills or leaks should be cleaned up immediately, and chemical run-downs into sinks, floors or stormwater drains should be prevented.

6.1.21. Prior to storing chemicals in the chemical storage facility, the following steps should be followed:

a) consult chemical inventory on all chemicals to be kept in the storage area.

b) consult the safety data sheets or technical guidance sheets regarding the storage recommendations, compatibility with other chemicals.

c) prepare a chemical storage plan accordingly.

Module 6: Ensuring safe storage and transport of chemicals

Quick check on storage layout

- Storage layout and siting of stores prepared in advance/available
- Areas for storage and movement assigned, taking into account
  - ✓ Chemical segregation requirements and storage classes
  - ✓ Maximum storage quantities to be expected
  - ✓ Regulatory and supplier recommended chemical storage limits (quantity, type) and arrangements (e.g. divider walls, secondary containments)
  - ✓ Special storage requirements (see safety data sheets)
  - ✓ Space requirements for safe movement of personnel and fork-lifts
  - ✓ Space required for allowing for storage and movements on pallets for easier rearrangement
- Colour floor markings used to clearly demarcate different storage and movement areas

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6.2 Applying practices in onsite and offsite transport of chemicals and chemical waste

6.2.1. Chemicals may be transferred to or from work areas through pipelines or conveyors or by using forklift trucks, trolleys or wheelbarrows. Before transport, the SDS of the chemical should be checked to understand the properties, safety concerns and precautions such as PPE safeguards.

6.2.2. The quantity, nature, integrity and protection of the packaging and containers used in transport, including pipelines, should be checked beforehand.

6.2.3. Chemicals transported by forklift truck should have warning labels, maximum load capacity information and maximum speed limit displayed.

6.2.4. Chemical transporting vehicles (e.g. forklift trucks) should travel on clearly marked passageways (i.e. aisles), of adequate width to reduce the possibility of collision and spillage.

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Quick check for transport using fork-lifts

- ☐ Safe practices in securing loading of containers and cylinders (special attention protection of valves!) established and applied
- ☐ Maximum loading limits were established and followed
- ☐ Smooth and wide enough passageways available to avoid excessive shocks or local stress on containers
- ☐ Speed limits for forklifts established and enforced
- ☐ Forklifts to be equipped with a fire extinguisher and an electrically conductive strip for earthing static electricity
- ☐ Special training and instructions provided to operators of transport vehicles (such as speed limits, maximum loads, internal transport routes)

Module 6: Ensuring safe storage and transport of chemicals

6.2 Applying practices in onsite and offsite transport of chemicals and chemical waste

6.2.5. Chemical containers should be handled carefully to avoid falling off the vehicle and from being subjected to rough usage, excessive shocks or local stress. Excessive shaking of liquid chemicals should be avoided to prevent leaking due to over volatilisation.

6.2.6. Containers for flammable liquids should be specially constructed with spring-located caps and flame arresters in their spouts. The transfer of flammable liquids should only be conducted in well-ventilated areas with the containers earthed and bonded.

6.2.7. Certain chemicals may be conveyed through pipe systems inside the factory. A standard colour coding system should be established to allow everybody in the factory to identify what the respective pipe may contain.

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6.2 Applying practices in onsite and offsite transport of chemicals and chemical waste

6.2.8. Adequate preparation should be made to address any emergency such as fire or spillage. For example, vehicle/forklift can be equipped with a fire extinguisher and an electrically conductive strip for earthing static electricity.

6.2.9. Special training and instructions should be provided to drivers/operators of transport vehicles, especially the ones who are involved in long range transport from/ to the factory. This training should include standard operating procedures for loading and unloading, safety precautions during driving and stoppage, and emergency responses in case of any accidents.

6.2.10. During loading and unloading operation the vehicle engine shall be stopped. The vehicle should be securely and efficiently stopped and no movement of the vehicle should be allowed. The drivers should not leave the vehicle so as to take any appropriate action in case of an emergency.

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6.2 Applying practices in onsite and offsite transport of chemicals and chemical waste

6.2.11. Chemical waste should be stored in a safe place before transportation. The storage area should be large enough to hold quantities of hazardous waste generated between the usual pickup dates or further scheduled times of disposal for the hazardous waste. This area should be protected from sun and rain, and leaching into the soil should be avoided.

6.2.12. Chemical waste should be transported in a properly sealed container with clear labelling of the compound and relevant safety warnings.

6.2.13. The waste transportation process, transporting vehicles and training for the appropriate personnel should be similar to the hazardous chemicals transportation guidelines as discussed before.

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