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Sub: Guidelines for Frame work to deal with chemical accidents in Industrial units
(covering isolated storage) through the Manufacture, Storage and
Import of Hazardous Chemicals rules and Chemical accidents - reg.

Attention is invited to the subject and reference cited. I enclose herewith the
guidelines for integrated guidance frame work developed by Central Pollution Control Board
for Chemical Safety in respect of the Isolated Storages and Industries covered under MSIHC
Rules, 1989. The guidelines are to be ensured Dangerous, Hazardous and Major
Accident Hazard factories.

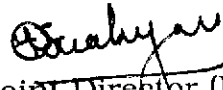
Yours Faithfully
(Sd/-)
Director of Factories & Boilers
Kerala

Enclosure: Guidelines

To

All Joint Directors of Factories & Boilers
All Inspectors of Factories & Boilers

Approved for Issue


Joint Director (HQ)

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Guidelines for Industries carrying Hazard Process, Isolated Storages and Handling Hazardous Chemicals

A. Guidelines for Industries and Isolated Storages :

Reporting

1. An occupier (of an industry or isolated storage) shall identify the major accident hazards and shall take adequate steps to prevent such major accidents and to limit their consequences to persons and the environment and shall provide the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety.
2. Where a major accident occurs on a site or in a pipe line, the occupier shall within 48 hours notify the concerned authority as identified in Schedule 5 (of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended) of that accident, and furnish thereafter to the concerned authority a report relating to the accidents in Schedule 6 (of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended)). However, the concerned authorities, local crisis group, District emergency authorities etc have to be informed by the occupier as early as possible.
3. The occupier shall not undertake any industrial activity or isolated storage unless he has been granted an approval for undertaking such an activity by the concerned authorities and has submitted a written report to the concerned authority containing the particulars specified in Schedule 7 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended. In case of an activity in which subsequently there is or is liable to be a threshold quantity or more of an additional hazardous chemical shall be deemed to be a different activity and the the occupier has to take a separate approval for undertaking such activity.
4. The occupier shall furnish a further report to the concerned authorities, in case the changes to the threshold quantity of hazardous chemicals are made
5. An occupier shall not undertake any industrial activity or isolated storage to which the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended) applies, unless he has prepared a safety report on that industrial activity containing the information specified in Schedule 8 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended) and has sent a copy of that report to the concerned authority at least ninety days before commencing that activity.
6. The occupier of both the new and the existing industrial activities or isolated storage shall carry out an independent safety audit of the respective industrial activities with the help of an expert, not associated with such industrial activities. The occupier shall forward a copy of the auditor's report along with his comments to the concerned authorities within 30 days after the completion of such audit.

7. The occupier shall update the safety audit report once a year by conducting a fresh safety audit and forward a copy of it with his comments to the concerned authorities.
8. The occupier, within 30 days of the completion of the safety audit, shall send a report to the Chief Inspector of Factories with respect to the implementation of the audit recommendations.
9. The occupier shall not make any modification to the industrial activity or isolated storage to which that safety report relates which could materially affect the particulars in that report, unless he has made a further report to take account of those modifications and has sent a copy of that report to the concerned authorities at least 90 days before making those modifications.
10. Where an occupier has made a safety report and that industrial activity or isolated storage is continuing, the occupier shall within three years of the date of the last such report, make a further report which shall have regard in particular to new technical knowledge which has affected the particulars in the previous report relating to safety and hazard assessment and shall within 30 days send a copy of the report to the concerned authority.
11. For the purpose of enabling the concerned authority to prepare the offsite emergency plan, the occupier shall provide the concerned authority with such information relating to the industrial activity or isolated storage under his control as the concerned authority may require, including the nature, extent and likely effects off-site of possible major accidents.
12. The occupier of an industry or isolated storage shall take appropriate steps to inform persons outside the site either directly or through District Emergency Authority who are likely to be in an area which may be affected by a major accident about the nature of the major accident hazard and the safety measures and the "Do's" and "Don'ts" which should be adopted in the event of a major accident. The occupier of a new industry or isolated storage shall take these steps, before that activity is commenced.
13. The industries/isolated storages shall update the comprehensive safety audit, on-site emergency plans and risk analysis reports annually and ensure that the reports are furnished to the concerned authorities.
14. The industry or isolated storage shall conduct comprehensive hazard identification and risk assessment (HIRA) to identify the non-compliances and take corrective actions for the non-compliances identified. Emergency plans shall be established to deal with leakages/accidents. The safety & hazard audit should identify the control measures necessary to be taken during an emergency.
15. A detailed study on the risk assessment and disaster management shall be carried out by the industry/isolated storage. Hazard identification and evaluation in a local community, preparation of standard operating procedures for accident prevention, preparedness and response, onsite emergency plans etc. Have to be reviewed at least once in year.
16. In the industries/isolated storages where gas leakages are suspected, an emergency plan to vent out/ neutralize the gases safely should be prepared.

17. All industries and isolated storages should have mitigation plans for spillages/ leakages of hazardous chemicals, fires, explosion or any other accident.
18. Standard Operating Procedure (SOP) for the steps to be taken during emergency situations/accidents shall be prepared by all industrial activities/ isolated storages that are handling hazardous chemicals.

Testing

19. The pressure test and leak test must be ensured after replacement of valves, pipes, joints etc. as per the original equipment manufacturer (OEM) manual or as per standard established procedure.
20. Check valves, relief valves should be installed at appropriate locations. Flow meters, sensors, measuring devices have to be regularly calibrated. Vents from relief valves shall be directed to a safe place.
21. Seals, glands and gaskets shall be regularly inspected, without dismantling. Leak detectors should be provided for all piping, valves, seals, flanges, and other pertinent equipment.
22. All hazardous chemicals carrying piping should be periodically inspected for failed insulation/vapour barrier, rust and corrosion. Damaged and deteriorated piping/equipment should be replaced.
23. Operation and process control systems like Supervisory Control and Data Acquisition (SCADA) and Leak Detection and Repair (LDAR) systems should be adopted by the major accident hazard installations.
24. The safety measures including valve regulated systems shall be regularly checked and the concerned workers involved in the activity shall be properly trained.
25. Periodic inspection of equipment and machineries with respect to safety aspects should be done.
26. Portable gas masks should be kept at critical locations for use in any emergency.
27. Material Safety Data Sheets of raw materials & products should be made available to all the concerned personnel.
28. The design of storage tanks, pressure vessels etc. should be as per applicable standards. The material of the storage tanks, pressure vessels etc should be of adequate strength and chemically inert for the chemicals to be stored. The inspection of storage tanks, pressure vessels etc. should be as per standard protocols.
29. All the vessels should be examined periodically by a competent person under the Factories Act/applicable extant laws.
30. Blanketing of tanks for fire protection of volatile/flammable chemicals should be considered.
31. Free fall of any flammable material in the vessel has to be avoided. All solvents and flammable material storage tanks should be at a safe distance from the process plant and required quantity of material should be charged in reactor through appropriate safe mode.

32. Earth connection should be provided to all solvent handling equipment, pipelines, reactors, vessels etc. for protection from electric current/static electricity.
33. Separate safety manual should be prepared for each equipment along with the emergency management plan.
34. Periodic testing of firefighting equipment should be conducted.

Duties

35. Mock drills must be conducted regularly at every six months by the industries/isolated storages in controlled environment on actions to be taken during accidents, gas leakage, failure of critical process parameters etc.
36. It shall be ensured that the chemical storage tanks should be appropriately located so that adequate space to take action during emergency situation is available.
37. A clear documented emergency procedure should be laid down which details the precise duties of all staff and arrangements for evacuation rescue, first aid etc. during an emergency.
38. All pipework containing hazardous chemicals shall be identified by colour coding or labelling (as per standards notified by Bureau of Indian Standards) and shall be protected to prevent corrosion/damage. The practice to identify the parts of the system that contain gas or liquid and the direction of flow should be followed.
39. The industry or isolated storage shall install sensors with alarm system for detecting leakage of hazardous chemicals. Emergency ventilation, electricity tripping system to stop the process, sprinkling system to contain the leaked hazardous chemicals/gases etc, may be interlinked with the sensors for taking a prompt action in case of leakage/emergency.
40. Suitable gas sensors and alarm system should be installed in the industrial unit/isolated storages at appropriate locations where emission of gas is suspected so that any leaked gas is detected and the employees are immediately alerted. In sensitive areas of the unit where gas leakages are suspected, the unit shall work out an emergency prepared plan to neutralize/vent out the gases safely.
41. The industries/isolated storages should install automatic alarming system to alert its personnel as well as surrounding localities simultaneously in case of emergency situation and likelihood of emergency situation if any process parameter goes out of control.
42. There should be auto alarm system to alert the employees in case of any deviations noticed in process parameter that may cause emergency.
43. Only fully trained and qualified operators shall be permitted to operate the industrial processes involving hazardous chemicals. Training to all employees on Standard Operating Procedures, production process, safety aspects etc. should be provided. Refresher trainings should be conducted at least every year regarding safety and emergency preparedness aspects associated with the

industrial process/isolated storage. The employees shall be given hands on experience with the production process under the supervision of senior employees. The industries/isolated storages only after ensuring that adequate training is imparted to its employees should engage the employees for independent works.

44. The industries and isolated storages should impart regular training to the staff to make them aware about process details, process functionalities. The employees should be trained to deal with emergencies arising out of leakage, abnormal temperature & pressure, increased emissions, pump failures, failure of air pollution control devices or effluent treatment plant, shock loads or any other accidents likely to occur. Overall the industries and isolated storages should be prepared for emergency response readiness & effectiveness in terms of major & minor accidents.
45. Any non-operational industry/isolated storage shall carry out proper risk study and safety audit before resuming the operations.
46. Hazard and operability study must be carried out strictly and regularly by the industries and isolated storages. The concerned personnel should be made aware of the hazard and safety aspects associated with the process and material handled by them.
47. The industry/isolated storage should procure chemicals from authorized dealers only. The spent solvents shall be procured from only those industries/solvent recyclers that are authorized by respective State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs).
48. The industry/isolated storage shall provide essential Personnel Protective Equipment (PPE) to all the concerned employees and make it mandatory that the employees have to wear PPE during working hours.
49. Occupational Health Surveillance i.e., periodical health check-up of the employees should be conducted by the industries/isolated storage.
50. The industries/isolated storages have to ensure self-compliance regarding recruiting competent staff, imparting industrial, environmental and safety training to the staff, conducting safety audit, onsite emergency plans with record maintenance and information to SPCBs/PCCs/concerned Authorities.
51. The distancing criteria for storage of hazardous chemicals have to be followed as per extant safety guidelines/rules. The chemicals should be stored as per compatibility and separate area for flammable, corrosive, explosive and toxic chemicals should be earmarked.
52. The labelling of hazardous chemical storing containers shall be as per extant rules. The concerned employees should be made aware of the risks associated with the stored hazardous chemicals and appropriate precautions that need to be taken.
53. To contain any spillage or leakage of hazardous chemicals or any uncontrolled reaction that may cause any emergency or accident, the industries/isolated storages should have sufficient stock of neutralizing chemicals, absorbents, reaction quenchers with proper equipment and trained manpower.

54. Emergency ambulance services should be arranged in the industrial zones with experienced doctors and paramedic staff.
55. Safety in operation greatly depends on proper commissioning of an industry/isolated storage and hence utmost care should be taken to monitor every aspect during erection and maintenance schedules or other areas which require proper planning.
56. The industries/isolated storages shall ensure that their premises should be constructed in accordance with the local government regulations.
57. A control room to deal with the emergencies should be commissioned by the industries/isolated storages. A quick response team of responsible officers should be constituted having duly assigned duties to be executed during emergencies.
58. The industry/isolated storage should conduct public awareness programmes in the surrounding localities about do's & don'ts during emergency situations on annual basis.
59. "Mutual Aid Scheme" among industries to meet required response measures during chemical emergencies should be adopted.
60. Emergency contact numbers should be readily available at the isolated storages or industrial installations similar to 'Crisis Alert System' or Red Book.
61. Placing/indicating hazard signs at appropriate places in the isolated storage or industry or outside the shop floor (within the premises) should be done.
62. Increased automation that avoids physical handling of dangerous chemicals and substances should be brought into practice.
63. The industry/isolated storage should have proper firefighting arrangements in accordance with The Factories Act, 1948/applicable extant laws.
64. All emergency valves and switches and emergency handling facilities should be easily accessible.
65. Safety audit reports shall be made online for public
66. To ensure safety during operation/handling/storage of hazardous chemicals, the industries/isolated storages wherever and as applicable, shall obtain requisite clearances from the Chief Inspector, Factories & Boilers/ Department of explosives/Fire Department etc. without fail.
67. The industries/isolated storages shall ensure that the effluent generated during any accident because of firefighting/decontamination activities etc. should be disposed in scientific manner after proper treatment. The hazardous wastes generated after any accident must be disposed in accordance with the extant rules.
68. Occupiers of storage installations like warehouses/tank farms are required to prepare an Onsite Emergency Plan and make available information regarding any possible offsite consequences to the District Collector to enable him to include the same in the Offsite Emergency Plan for the district or the particular area.

69. In order to avoid accidents, the following measures may be taken while establishing a warehouse/tank-farm. These should also be carried out in existing installations to enhance safety:
- i. Hazardous chemical storages should be located away from densely populated areas from drinking water sources, water bodies or from areas liable to flooding.
 - ii. The location should have easy access for transport and emergency services.
 - iii. Adequate emergency requirements like water for firefighting, drainage to prevent ground water contamination, standby source of electricity etc. should be provided
 - iv. The layout of warehouses should be designed in accordance with nature of materials to be stored. The construction material should be non-flammable.
 - v. Floors should be impermeable to liquids and should be designed for easy cleaning.
 - vi. Drains should not be connected directly to water ways or public sewers. The drains should be connected to an interceptor pit.
 - vii. Proper embankments to contain any accidental spillage should be provided for all hazardous materials storages.
 - viii. Loading and unloading operations are to be done with utmost care.
 - ix. Procedure for receipt, despatch and transport should be clearly laid down.
 - x. Details of hazardous chemicals, access and escape routes, available emergency & firefighting equipment should be available.
 - xi. In addition to a storage plan, a safe operation of a storage facility should have planning for safety training, personal protective clothing and equipment, spillages and leaking containers, waste disposal, first aid, fire detection and protection equipment, environment protection, proper on site emergency plan etc.
70. Wherever applicable, the industries or the isolated storages shall invariably comply with the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended). The Major Accident Hazard Control Rules, 1997, The Factories Act, any other applicable rules or guidelines issued by the respective Government of State/Union Territory, The Ministry of Labour & Employment, Petroleum and Explosive Safety Organization, Oil Industry Safety Directorate etc.

B. Guidelines on the On Site Emergency Plan

1. The occupier of an industrial activity/isolated storage shall prepare and keep up-to-date on-site emergency plan containing details specified in Schedule 11 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended) detailing how major accidents will be dealt with on the site on which the industrial activity is carried on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorized to take action in accordance with the plan in case of an emergency.

2. The occupier shall ensure that the emergency plan prepared takes into account any modification made in the industrial activity/isolated storage and that every person on the site who is affected by the plan is informed of its relevant provisions.
3. The occupier shall prepare the emergency plan in the case of a new industrial activity or isolated storage, before that activity is commenced.
4. The occupier shall conduct a mock drill of the on-site emergency plan every six months and a detailed report of the mock drill conducted shall be made immediately available to the concerned authorities as and when demanded.
5. With every change or modification made in a factory, operation or process, the on-site emergency plan may have to be modified and updated to keep it meaningful and effective. An on-site emergency plan should contain the following key elements :
 - i. basis of the plan and hazard analysis,
 - ii. accident prevention procedure/measures,
 - iii. accident/emergency response procedure/measures, and
 - iv. recovery procedure

Proper planning by industries/isolated storages helps in reducing the chances of accidents. For proper planning, the following needs to be considered:

- i. risk associated with the process technology,
- ii. safety measures,
- iii. siting and layout of industry/isolated storage,
- iv. emergency preparedness, and
- v. compliance with the regulatory requirements.

Assessing the hazard potential of an installation is the first step in planning for emergencies. Preliminary Hazard Analysis which comprises hazard identification and vulnerability analysis should always be carried out at the conceptual stage for all installations including small and medium installation. However, Major Accident Hazard (MAH) installations, both existing and proposed ones, should carry out a risk analysis.

Hazard Analysis:

Hazard analysis is a critical component in planning for emergencies. To analyse the safety of a major installation as well as its potential hazards, a hazard analysis should be carried out covering the following areas:

- i. The toxic, reactive, explosive flammable substance in the installation that constitute a major hazard.
- ii. The failures or errors that may cause abnormal conditions leading to a major accident
- iii. The consequences of a major accident for the workers, people living or working outside the installation and the environment.

- iv. Preventive measures for accidents
- v. Mitigation of the consequences of an accident

Vulnerability Analysis:

Considering the maximum loss scenario e.g. catastrophic vessel rupture, the occupier may estimate the vulnerable zone or the zones which will be affected by the release of hazardous chemicals. It should be borne in mind that every effort should be made to confine the vulnerable zone within the factory premises. In order to achieve this, the following could be adopted:

- i. Reduce the quantity of hazardous substances stored
- ii. Split the hazardous storages into number of smaller ones.
- iii. Isolate the storages that might lead to cascading effect.
- iv. Substitute extremely hazardous substances with less hazardous substance.

Risk Analysis:

Risk Analysis can provide a relative measure of the likelihood and severity of various possible hazardous events and enable the emergency plan to focus on the greatest potential risks. Risk analysis involves an estimate of the probability or likelihood that an event will occur.

C. Guidelines on Safety Audit :

1. The safety audits should be conducted by the competent agency to be accredited by an Accreditation Board to be constituted by the Ministry of Labour and Employment, Government of India in this behalf and in absence of such Accreditation Board by a competent agency approved by Chief Inspector of Factories.
2. The qualifications and experience of safety auditor should be as per extant rules.
3. The safety auditor carrying out the safety audit under Rule 10 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (MSIHC Rules, 1989) shall bring out the status of compliance by the occupier in his safety audit report in addition to the Compliance of provisions of the MSIHC Rules, 1989 (as amended from time to time) and the state CIMAH Rules. A copy of the safety audit report to be forwarded by the safety auditor to the concerned authority as identified under schedule 5 of the MSIHC Rules, 1989.
4. The audit should be carried out as per IS 14489:2018 – Code of Practice on Occupational Safety & Health Audit (as amended time to time).
5. The broad areas to be covered in the Safety Audit should be :
 - i. Occupational Health and Safety Management
 - ii. Physical, Mechanical and Electrical Hazards and their Control Measures
 - iii. Chemical Hazards and their Control Measures
 - iv. Fire and Explosion Hazard and their Control Measures
 - v. Industrial Hygiene/Occupational Health

vi. Accident/Incident Reporting, Investigations and Analysis

vii. Emergency Preparedness (onsite/offsite)

viii. Safety inspection

6. The Objectives of Safety Audit should be :

- i. To examine the existing procedures, system and control measures for hazards.
- ii. To assess the adequacy of hazard identification
- iii. To identify potential hazards not covered by the existing safety systems, procedures and practices.
- iv. To identify the adequacy of the control measures put in place by the occupier.
- v. To bring out any deviation from the set procedures and statutory non-compliance.
- vi. To recommend improvements for better effectiveness of the existing safety system, procedures & practices and also other measures of hazards control.
- vii. To recommend system, procedure and control measures for identified hazards.
- viii. To study compliance with statutory provisions and relevant codes of practice and recommend actions to be taken, wherever there is non-compliance.
- ix. To identify the compliance with the provisions under these guidelines.

(Sd/-)

Director of Factories & Boilers