

Government of Maharashtra
Directorate of Industrial Safety and Health

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Subject: Safety guidelines for chemical Factories

Introduction:

In the current situation of Covid-19 lockdown, the inspection of all the factories may not be possible by this directorate. Hence all such type of factories are hereby directed to follow the following safety measures in addition to the provisions of The Factories Act, 1948 and The Maharashtra Factories Rules, 1963.

The given guide lines are not exhaustive in nature; any additional precaution as may be necessary based on specific requirement should be adopted by the factory management for safe manufacturing operation of the factory based on the nature of manufacturing activity

Part I

1. Application:-This Schedule shall apply to all manufactures and processes incidental thereto carried on in chemical works.

2. Definitions:-

For the purpose of this Schedule,-

- (a) "Chemical Works" means any factory or such parts of any factory where any process or activity in relation to the industries is specified in this First Schedule of the Act;
- (b) "Efficient exhaust draught" means localized ventilation effected by mechanical or other means for the removal of gas, vapor, fume or dust to prevent it from escaping into the air or any place in which work is carried on.
- (c) "bleaching powder" means the bleaching powder commonly called chloride of lime;
- (d) "chlorate" means chlorate or per chlorate;
- (e) "caustic" means hydroxide of potassium or sodium;
- (f) "chrome process" means the manufacture of chromate or bi chromate of potassium or sodium, or the manipulation, movement or other treatment of these substances;
- (g) "nitro or amino process" means the manufacture or nitro of amino derivatives of phenol and of benzene or its homologues, and the making of explosives

with the use of any of these substances;

- (h) the term "permit to work" system means the compliance with the procedures laid down under Para 20 of Part II;
- (i) "toxic substances" means all those substances which when they enter into the human body, through inhalation or ingestion or absorption through skin, in sufficient quantities, causes fatality or exert serious affection of health, or chronic harmful effects on the health of persons exposed to it due to its inherent chemical effects, in respect of substances whose Threshold Limit Value (TLV) is specified in the second Schedule of the Act, exceeding the concentration specified therein would make the substance toxic;
- (j) "emergency" means a situation leading to a circumstance or set of circumstances in which there is danger to the life or health of persons or which could result in big fire or explosion or pollution to the work and outside environment, affecting the workers or neighborhood in a serious manner, demanding immediate action;
- (k) "dangerous chemical reactions" means high speed reactions, runaway reactions, delayed reactions, etc. and are characterized by evolution of large quantities of heat, intense release of toxic or flammable gases or vapors, sudden pressure build-up etc.;
- (l) "Manipulation" means mixing, blending filling, emptying, grinding, sieving, drying, packing, sweeping handling using etc.;
- (m) "approved personal protective equipment" means items of personal protective equipment conforming to the relevant Indian Standard Institute specifications (ISI) or in the absence of it, personal protective equipment approved by the Chief Inspector of Factories;
- (n) "appropriate personal, protective equipment" means that when the protective equipment is used by the worker, he shall have no risk to his life or health or body; and
- (o) "Confined space" means any space by reason of its construction as well as in relation to the nature of the work carried therein and where hazards to the persons entering into working inside exist or are likely to develop during working.

Part II

General Requirements Applying To All the Works in the First Schedule of the Act

1. Housekeeping:-

- (1) Any spillage of materials shall be cleaned up before further processing.
- (2) Floors, platforms, stairways, passages and gangways shall be kept free of any obstructions.

(3) There shall be provided easy means of access to all parts of the plant to facilitate cleaning.

2. Improper use of chemicals:-

No chemicals or solvents or empty containers containing chemicals or solvents shall be permitted to be used by workers for any purposes other than in the processes for which they are supplied.

3. Prohibition on the use of food etc.:-

No food, drink, tobacco, pan or any edible item shall be stored or heated or consumed in or near any part of the plant or equipment.

4. Cautionary notices and instructions:-

(1) Cautionary notice in a language understood by the majority of workers shall be prominently displayed in all hazardous areas drawing the attention of all workers about the hazards to health, hazards involving fire and explosion and any other hazard such as consequences of testing of material or substances used in the process or using any contaminated container for drinking or eating, to which the workers attention shall be drawn for ensuring their safety and health.

(2) In addition to the above cautionary notice, arrangement shall be made to instruct and educate all the workers including illiterate workers about the hazards in the process including the specific hazards to which they may be exposed to, in the normal course of their work. Such instructions and education shall also deal with the hazards involved in unauthorized and unsafe practices including, the properties of substances used in the process under normal conditions as well as abnormal conditions and the precautions to be observed against each and every hazard. Further, an undertaking from the workers shall be obtained within 1 month of their employment and for old workers employed within one month of coming into operation of these rules, to the effect that they have read the contents of the cautionary notices and instructions, understood them and would abide by them. The training and instructions to all workers and the supervisory personnel shall include the significance of different types of symbols and colors used on the labels stuck or painted on the various types of containers and pipe-lines.

5. Evaluation and provision of safeguards before the commencement of process:-

(1) Before commencing any process or any experimental work, or any new manufacture covered under first Schedule of the Act, the occupier shall take all possible steps to ascertain definitely all the hazards involved both from the actual operations and the chemical reactions. Including the dangerous chemical reactions. The properties of the raw materials used, the final products to be made and any by-products derived during manufacture, shall be carefully studied and provisions shall be made for dealing with any hazards including effects on workers may occur during manufacture.

(2) Information in writing giving details of the process, its hazards and the steps taken or proposed to be taken from the design stage to disposal stage for ensuring the safety as in sub-para (1) above shall be sent to the Chief inspector at the earliest but in no case less than 15 days before commencing manufacture, handling or storage of any of the

items covered under first Schedule of the Act whether on experimental basis, or as pilot plant or as trial production or as large scale manufacture.

- (3) The design, construction, installation, operation, maintenance and disposal of the buildings, plant and facilities shall take into consideration effective safeguards against all the safety and health hazards so evaluated.
- (4) The requirements under the sub-paras (1) to (3) shall not act in lieu of or in derogation to any other provisions contained in any other Act governing the work.

6. Authorised entry:-

Authorized persons only shall be permitted enter any section of the factory of plant on or where dangerous chemical reactions are taking place or where hazardous chemicals are stored.

7. Examination of instruments and safety devices:-

- (1) All instruments and safety devices used in the process shall be tested before taking into use and after carrying out any repair to them and, examined once in a month by a competent person, records of such tests and examinations shall be maintained in a register.
- (2) All instruments and safety devices used in the process shall be operated dally or as often as it is necessary, to ensure it's effective and efficient working at all times.

8. Electrical installations:-

All electrical installations used in the process covered in the first Schedule of the Act, shall be of an appropriate type to ensure safety against the hazard prevalent in that area such as suitability against dust, dampness, corrosion, flammability and explosiveness etc. and shall conform to the relevant Indian Standard Institute (ISI) specifications governing their construction and use for that area.

9. Handling and storage of chemicals:-

- (1) The containers for handling and storage of chemicals shall be of adequate strength taking into consideration the hazardous nature of the contents. They shall also be provided with adequate labeling and color coding arrangements to enable identification of the containers and their contents indicating the hazards and safe handling methods and shall conform to the respective Indian Standard Institute (ISI) standards. The instructions given in the label shall be strictly adhered to. Damaged containers shall be handled only under supervision of a knowledgeable and responsible person and spillage shall be rendered innocuous in a safe manner using appropriate means.
- (2) The arrangements for the storage of chemicals including charging of chemicals in reaction vessels containers shall be such as to prevent any risk of fire or explosion or formation of toxic concentration of substances above the limits specified in second Schedule of the Act.
- (3) Without prejudice to the generality of the requirements in sub-para (2) above, the

arrangements shall have suitable ventilation facilities and shall enable the maintenance of safe levels in vessels and containers. Such arrangements shall also take into consideration, the type of flooring and the capacity of flooring and the compatibility requirements of substances with other chemicals store nearby.

- (4) (a) Storage of chemicals and intermediate products, which are highly unstable or reactive or explosive shall be limited to the quantities required for two months use.
 - (b) Whenever the quantities laid down in the above clause (a) are to be exceeded, the permission of the Chief Inspector shall be obtained.
 - (c) Notwithstanding anything contained in clauses (a) and (b) above, the Chief Inspector of Factories may direct any factory carrying out processes covered in the first schedule of the Act, to further limit the storage of hazardous substances to quantities less than two months in considerations of safety.
- (5) Standby arrangements equal to the biggest container shall always be available to transfer the toxic substances quickly into the standby storage facility if any defect developed in any of the container resulting in the release of toxic substances.
 - (6) Any storage facility constructed using non-metallic material such as Fiber glass Reinforced Plastics (FRP) all glass vessels etc. shall have adequate a strength to withstand the stress. If any, exerted by the contents and shall be properly anchored, working platforms, access ladders, pipe lines etc. used in such storage facility shall not have any support on the structure of the storage facility and shall be independently supported.

10. Facility for isolation:-

The plant and equipment shall be so constructed and maintained as to enable quick isolation of plant or part of plant or equipment, with appropriate indication. One copy of the layout plant indicating the isolation facilities shall always be available with the security, the maintenance and the health and safety personnel, and these isolation facilities shall be checked for its effectiveness once in a month.

11. Personal protective equipment:-

- (1) All workers to the hazards in the processes covered by the Schedule shall be provided with appropriate and approved type of personal protective equipment. Such equipment shall be in a clean, sterile and hygienic condition before issue.
- (2) The occupier shall arrange to inform, educate and supervise all the workers in the use of personal protective equipment while carrying out the job.
- (3) As regards any doubt regarding the appropriateness of any personal protective equipment, the decision of the Chief Inspector shall be final.

12. Alarm systems:-

- (1) Suitable and effective alarm systems giving audible and visible indications, shall be

installed at the control-room as well as in all strategic locations where process-control arrangements are available so as to enable corrective action to be taken before the operational parameters exceed the predetermined safe levels or lead to conditions conducive for the outbreak of fire or explosion to occur: such alarm system shall be checked daily and tested every month at least once to ensure its performance efficiency at the times.

- (2) The Chief Inspector of Factories may direct such system to be installed in case of plants or processes where toxic materials are being used and spillage or leakage of which may cause wide spread poisoning in or around the plant.

13. Control of escape of substances into the work atmosphere:-

- (1) Effective arrangements such as, enclosure, or by-pass, or efficient exhaust draught maintenance of negative pressure etc., shall be provided in all plants, containers, vessels, sewers, drains, flues, ducts, culverts, and hurried pipes and equipment to control the escape and spread of substances which are likely to give rise to fire or explosion or toxic hazards during normal working and in the event of accident or emergency.
- (2) In the event of the failure of the arrangements for control resulting in the escape of substances in the work atmosphere, immediate steps shall be taken to control the process in such a manner, that further escape is brought down to the safe level.
- (3) The substances that would have escaped into the work atmosphere before immediate steps as required in sub-para (2), shall be rendered in nocuous by diluting with air or water or any other Suitable agent or by suitably treating the substances.

14. Conduct of dangerous chemical reactions:-

Suitable provision, such as automatic and/or remote control arrangements, shall be made for controlling the effects of dangerous chemical reactions'. In the event of failure of control arrangements automatic flooding or blanketing or other effective arrangements shall come into operation.

15. Testing examination and repair of plant and equipment:-

- (1) All parts of plant, equipment and machinery used in the process which in the likely event of their failure may give rise to an emergent situation shall be tested by a competent person before commencing process and retested at an interval of two years or after carrying out repairs to it. The competent person shall identify the parts of the plant, equipment and machinery required to be tested as aforesaid and evolve a suitable testing procedure, in carrying out the test as mentioned above in respect of pressure vessels or reaction vessels the following precautions shall be observed, namely:-
 - (a) Before the test is carried out, each vessel shall be thoroughly cleaned and examined externally, and as far as practicable internally also for surface defects, corrosion, and foreign matter. During the process of cleaning and removal of sludge, if any, all due precautions shall be taken against fire or explosion, if such sludge is of pyrophoric nature or contains spontaneously

combustible chemicals;

- (b) as soon as the test is completed, the vessel shall be thoroughly dried internally and shall be clearly stamped with the marks and figures indicating the person by whom testing has been done and the date of test; and
 - (c) any vessel which fails to pass the test or which for any other reason is found to be unsafe for use shall be destroyed or rendered unusable under intimation to the Chief Inspector.
- (2) All parts of plants, equipment, machinery which in the likely event of failure may give rise to an emergent situation shall be examined once in a month by the competent person.
 - (3) Records of testing and examination referred to in paragraphs (1) and (2) shall be maintained as long as that part of the plant, equipment, and machinery are in use.
 - (4) All repair work including alteration, modification and addition to be carried out to the plant, equipment and machinery shall be done under the supervision of a responsible person who shall evolve a procedure to ensure safety and health of persons doing the work. When repairs or modification is done on pipeline, and joints are required to be welded, but welding of joints shall be preferred. Wherever, the responsible person shall regulate the aforesaid work through a 'permit to work system'.

16. Staging:-

- (1) All staging that is erected for the purpose of maintenance work or repair work or for work connected with entry into confined spaces and used in the processes included in first Schedule of the Act, shall be state, rigid and constructed out of substantial material of adequate strength, such staging shall conform to the respective Indian Standard specifications.
- (2) Staging shall not be erected over any closed or open vessel unless the vessel is so constructed and ventilated to prevent exposure of persons working on the stages.
- (3) All the staging constructed for the purpose of this Para shall have appropriate access which are safe and shall be fitted with proper hand-rails to a height of one meter and toe board.

17. Seating arrangements:-

The seating arrangements provided for the operating personnel working in processes covered in the first Schedule shall be located in a safe manner as to prevent the risk of exposure to toxic, flammable and explosive substances evolved in the work environment in the course of manufacture of repair or maintenance, either due to failure of plant and equipment or due to the substances which are under pressure, escaping into the atmosphere.

18. Entry into or work in confined spaces:-

- (1) The occupier of every factory to which the provisions of this Schedule apply, shall ensure the observance of the following precautions before permitting and person to

enter or work inside the confined spaces.:-

- (a) to identify all confined spaces and the nature of hazards that are encountered in such spaces, normally or abnormally, and arrange to develop the most appropriate safeguards for the safety and health of persons entering into or working inside, the confined spaces;
 - (b) to regulate the entry or work inside the confined spaces a 'permit to work system' which shall include the safeguards so developed as required under sub-clause (a)above;
 - (c) to render the place safe before testing the confined space for entry into or work by washing or cleaning with neutralizing agents; or purging with steam or inert gases and making adequate forced ventilation arrangements;
 - (d) to arrange to carry out such tests as are necessary for the purpose by a competent person and ensure that the confined space is safe for the persons to enter or work Such testing shall be carried out as often as is necessary during the course of work to ensure its continued safety;
 - (e) to arrange to educate and train the personnel who would be required to work in confined spaces about the hazards involved in the work. He shall also keep in readiness the appropriate and approved personal protective equipment including arrangements for rescue, resurrexion and first aid, and shall arrange supervision of the work at all times by a responsible and knowledgeable person.
- (2) The manager shall maintain a log book of every entry into or work in, confined spaces and such record shall contain the details of persons assigned for the work, the location of the work and such other details that would have a bearing on the safety and health of the persons assigned for this work. The log book so maintained shall be retained as long as the concerned workers are in service and produced to the Inspector when demanded.

19. Maintenance work etc.:-

- (1) All the work connected with the maintenance of plants and equipment including cleaning of empty containers which have held hazardous substances used in the processes covered in this schedule, shall be carried out under 'permit to work system' employing trained personnel and under the supervision of responsible person, having knowledge of the hazards and precaution required to deal with them.
- (2) Maintenance work shall be carried out in such a manner that there is no risk to persons in the vicinity or to persons who pass by. If necessary, the place of such work shall be cordoned off or the presence of unconnected persons effectively controlled.

20. Permit to work system:-

The permit to work system shall inter-alia include the observance of the following precautions while carrying out any specified work to be subjected to the permit to work system:-

- (a) all work subject to the permit to work system shall be carried out under the supervision of a knowledgeable and responsible person;
- (b) all parts of plant or machinery or equipment on which permit to work system is carried out, shall remain isolated from other parts throughout the period of permit to work and the place of work including the parts of plant, machinery shall be rendered safe by cleaning, purging, washing etc.;
- (c) all work subject to the permit to work system shall have predetermined work procedure which integrate safety with the work. Such procedures shall be reviewed whenever any change occurs in material or equipment so that continued safety is ensured;
- (d) persons who are assigned to carry out the permit to work system shall be physically fit in all respects taking into consideration the demands and nature of the work before entering into the confined space. Such person shall be adequately informed about the correct work procedure as well as the precautions to be observed while carrying out the permit to work system;
- (e) adequate rescue arrangements wherever considered necessary and adequate first aid, rescue and resurrection arrangements shall be available in good working condition near the place of work while carrying out the permit to work system, for use in emergency;
- (f) appointed and approved protective equipment shall be used while carrying out the permit to work system;
- (g) after completion of work subject to the 'permit to work system' the person responsible shall remove all the equipment and tools and restore to the original condition so as to prevent any danger while carrying out regular process.

21. Safety sampling personnel:-

The occupier shall ensure the safety to persons assigned for collecting samples by instructing them on the safe procedures. Such personnel shall be provided with proper and approved personal protective equipment, if required.

22. Ventilation:-

Adequate ventilation arrangements shall be provided and maintained in the process area where dangerous or toxic or flammable or explosive substances could be evolved. These arrangements shall ensure that concentrations, which are either harmful or could result in explosion, are not permitted to be built up in the work environment.

23. Procedure for meeting emergencies:-

- (1) The occupier of every factory carrying out the works covered in the first Schedule of the Act, shall arrange to identify all types of possible emergencies that could in the processes during the course of work or while carrying out maintenance work or repair work. The emergencies so identified shall be reviewed yearly.

- (2) The occupier shall formulate a detailed plant to meet all such identified emergencies including arrangements for summoning outside help for rescue and firefighting and arrangements for making available urgent medical facilities.
- (3) The occupier shall send the list of emergencies and the details of procedures and plans formulated to meet the emergencies, to the Chief Inspector of Factories.
- (4) The occupier shall arrange to install distinctive and recognizable warning arrangements to caution all persons inside the plant as well as the neighboring community, if necessary, to enable evacuation of persons and to enable the observance of emergency procedures by the persons who are assigned emergency duties. All concerned must be well informed about the warning arrangements and their meaning. The arrangements must be checked for its effectiveness every month.
- (5) Alternate power supply arrangements shall be made and interlocked with the normal power supply system so as to ensure constant supply of power to the facilities and equipment meant for compliance with requirements of paragraphs 10, 11, 12, 13, 14, 18, 22, and this paragraph of Part II, Part III, Part IV and Part V of this Schedule.
- (6) The occupier shall arrange to suspend the further process work in a place where emergency is established and shall forthwith evacuate all persons in that area except workers who have assigned emergency duties.
- (7) All the employees of the factory shall be trained about the action to be taken by them including evacuation procedure during emergencies.
- (8) All emergency procedures must be repeated every three months and deficiencies, if any, in the achievement of the objectives shall suitably be corrected.
- (9) The occupier shall arrange to have ten percent of the workers trained in the use of first aid, fire-fighting appliances and in the rendering of specific first aid measures taking-into consideration the special hazards of the particular process.
- (10) The occupier shall furnish immediately, on request the specific chemical identity of the hazardous substance to the treating physician when the information is needed to administer proper emergency or first-aid treatment to exposed person.

24. Danger due to effluents:-

- (1) Adequate precautions shall be taken to prevent the mixing of effluents from different processes and operations which may cascade dangerous or poisonous gases to be evolved.
- (2) Effluents which contain or give rise in the presence of other effluents to poisonous gases shall be provided with independent drainage systems to ensure that may be trapped and rendered safe.

Part III

Fire and Explosions Risks

1. (1) No internal combustion engine and no electric motor or other electrical equipment, and fittings and fixtures capable of generating sparks or otherwise causing combustion or any other source of ignition or any naked light shall be installed or permitted to be used in the process area where there could be fire and explosion hazards.
- (2) All hot exhaust pipes shall be installed outside a building and other hot pipes or hot surface or surface likely to become hot shall be suitably protected.
- (3) The classification of work area in terms of its hazard potential and the selection of electrical equipment or other equipment that could constitute a source of ignition shall be in accordance with respective Indian Standard.
- (4) Where a flammable atmosphere may be prevalent or could occur, the soles of footwear worn by workers shall have no metal on them, and the wheels of trucks or conveyors shall be nonconductive type.
- (5) All tools and appliances used for work in this area shall be of non-sparking type.
- (6) Smoking in process area where there are risks of fire and explosion shall be prohibited, and warning notice in the language understood by majority of workers shall be pasted in the factory prohibiting smoking into specified areas.

2. Static electricity:-

- (1) All machinery and plant, particularly, pipe lines and belt drives, on which static charge is likely to accumulate, shall be effectively earthed. Receptacles for flammable liquids shall have metallic connections to the earthed supply tanks to prevent static sparking where necessary, humidity shall be regulated.
- (2) Mobile tanker wagons shall be earthed during filling and discharge and precautions shall be taken to ensure that earthing is effective before such filling or discharge, takes place.

3. Lightning protection:-

Lightning protection arrangement shall be fitted where necessary, and shall be maintained.

4. Process heating:-

The method of providing heat for a process likely to result in fire and explosion shall be as safe as possible and where the use of naked flame is necessary, the plant shall be so constructed as to prevent any escaping flammable gas, vapor, or dust coming into contact with the flame, or exhaust gases, or other sources likely to cause ignition. Wherever possible, the heating arrangement shall be automatically controlled at a pre-determined temperature below the danger temperature.

5. Leakage of flammable liquids:-

- (1) Provision shall be made to confine by means of bund walls, dykes, sumps etc. possible

leakages from storage vessels containing flammable liquids.

- (2) Waste material in contact with flammable substances shall be disposed of suitably under the supervision of knowledgeable and responsible person.
- (3) Adequate and suitable fire-fighting appliances shall be installed in the vicinity of such vessels.

6. Safety valves:-

Every still and every closed vessel in which gas is evolved or into which gas is passed, and in which the pressure is liable to rise above the atmospheric pressure, shall have attached to it a pressure gauge, and a proper safety valve or other equally efficient means to relieve the pressure. These appliances shall be maintained in good condition.

7. Installation of pipe line etc.:-

All pipelines carrying flammable or explosive substances shall be protected from mechanical damage and shall be examined by a responsible person once in a week to detect any deterioration or defects, for accumulation of flammable or explosive substances, and record kept of any defects found and repairs made.

8. Fire-fighting systems:-

- (1) Every factory employing 500 or more persons and carrying out processes listed in the First Schedule of the Act, shall provide:-
 - (a) trained and responsible fire-fighting squad so as to effectively handle the fire-fighting and life-saving equipment in the event of fire or other emergency. Number of persons in this squad shall necessarily depend upon the size of risk involved, but in no case shall be less than 8 such trained persons to be available at any time. The squad shall consist of watch and ward personnel, fire pump man and departmental supervisors and operators trained in the operation of fire and emergency services;
 - (b) squad leaders shall preferably be trained in a recognized Government institution and their usefulness enhanced by providing residence on the premises;
 - (c) Squad personnel shall be provided with clothing and equipment including helmets, boots and belts.
- (2) A muster roll showing the duties allocated to each member of the squad shall be prepared and copies supplied to each such leader as well as displayed in prominent places so as to be easily available for reference in case of emergency.
- (3) The pump man shall be thoroughly conversant with the location of all appliances. He shall be responsible for maintaining all fire-fighting equipment in proper working order. Any defect coming to his notice shall be immediately brought to the notice of squad leader.

- (4) As far as is practicable, the fire pump room and the main gate(s) of the factory be connected to all manufacturing or storing areas through telephone interlinked and placed in a convenient location near such areas.

Part IV

Risks of Toxic Substances

1. Leakage:-

- (1) All plants shall be so designed and constructed as to prevent the escape of toxic substance. Where necessary, separate building, rooms, or protective structures shall be used for the dangerous stages of the process and the building shall be so designed as to localize and escape of toxic substances.
- (2) Catch bund walls, dykes, or other suitable safeguards shall be provided to restrict the serious effects of such leakage. Catch pits shall be places below joints in pipelines where there is danger involved to maintenance and other workers from such leakage.

2. Drainage:-

Adequate drainage shall be provided and shall lead to collection tanks specifically provided for this purpose wherein deleterious material shall be neutralized treated or otherwise rendered safe before it is discharged into public drains or sewers.

3. Covering of vessels:-

- (1) Every fixed or structure containing any toxic substance and not so covered as to eliminate all reasonable risk of accidental contact of any portion of the body of a worker, shall be so constructed as to avoid physical contact.
- (2) Such vessel shall, unless its edge is at least 90 centimeters above such adjoining ground or platform.
- (3) Where such vessels adjoin and the space between them clear of any surrounding brick or other work is either less than 45 centimeters in width or in 45 or more centimeters in width, but is not securely fenced on both to a height of at least 90 centimeters, secure barriers shall be so placed as to prevent passage between them:

Provided that sub-paragraph (2) of this paragraph shall not apply to saturators used in the manufacture of sulphate of ammonia; and that part of the sides of brine evaporating pans which require raking, drawing or filling.

4. Continuous exhaust arrangement:-

- (1) Any process evolving toxic vapor, gas gume and substance shall have efficient

continuous exhaust draught. Such arrangement shall be interlocked in the process control wherever possible.

- (2) in the event of failure of continuous exhaust arrangement means shall be provided to automatically stop the process.

5. Workbench:-

All the work benches used in processes involving the manipulation of toxic substances shall be graded properly and shall be made of smooth impervious surface which shall be washed daily after the completion of work.

6. Waste disposal:-

- (1) There shall be provided a suitable receptacle made of non-absorbable material with a tightly fitting cover for depositing waste material soiled with toxic substance and the contents of such receptacle shall be destroyed by burning or using other suitable method under the supervision of a responsible person.
- (2) During the course of manufacture, whenever any batch or intermediate products having toxicity is rejected or considerations of quality, sufficient precautions shall be taken to render them innocuous or otherwise treat them or inactive them, before disposal.
- (3) The empty containers of toxic substances shall be cleaned thoroughly before disposal under the supervision of a responsible person.

Part V Special Provisions

1. Special precautions for nitro or amino processes:-

- (1) Unless the crystallized nitro or amino substances or any of its liquor is broken or agitated in a completely enclosed process so as not to give rise to dust or fume, such process shall be carried on under an efficient exhaust draught or by adopting any other suitable means in such a manner as to prevent the escape of dust or fume in the working atmosphere.
- (2) No part of the plant or equipment or implements which was in contact with nitro or amino compounds shall be repaired, or handled unless they have been emptied and thoroughly cleaned and decontaminated.
- (3) Filling of containers with nitro or amino compounds shall be done only by using a suitable scope to avoid physical contact and the drying of the containers in the stove shall be done in such a manner that the hot and contaminated air from the stove is not drawn into the workroom.
- (4) Processes involving the steaming into or around any vessel containing nitro or amino compounds or its raw materials shall be carried out in such a manner that the steam or vapor is effectively prevented to be blown back into the working atmosphere.
- (5) Suitable antidotes such as methylene blue injections shall always be available at designed places of work, for use during emergency involving the poisoning with nitro

or amino compounds.

2. Special precautions for "chrome processes":-

- (1) Grinding and sieving of raw materials in chrome processes shall be carried on in such a manner and under such condition as to secure effective separation from any other processes and under an efficient exhaust draught.
- (2) There shall be washing facilities located very near to places where wet chrome processes such as leaching acidification, sulphate setting, evaporation, crystallization, centrifugation or packing are carried out, to enable quick washing of affected parts of body with running water.
- (3) Weekly inspection of hand and feet of all persons employed in chrome process shall be done by a qualified nurse and record of such inspections shall be maintained in a form approved by the Chief Inspector of Factories.
- (4) There shall be always available at designated places of work suitable ointment such as glycerin, Vaseline etc. and water proof plaster in a separated box readily accessible to the workers so as to protect against perforation of nasal septum.

3. Special precautions for processes carried out in all glass vessels:-

- (1) Processes and chemical reactions such as manufacture of Phenyl chloride, benzyl chloride etc. which are required to be carried out in all glass vessels shall have suitable means like substantial wire mesh covering to protect persons working nearby in the event of breakage of glass vessel.
- (2) Any spillage or emission of vapor from the glass vessel due to breakage, shall be immediately inactivated or rendered innocuous by suitable means such as dilution with water or suitable solvents so as to avoid the risks of fire or explosion or health hazards.

4. Special precautions or processes involving chlorate manufacture:-

- (1) Crystallization, grinding or packing of chlorate shall not be done in a place used for any other purpose and such places shall have hard, smooth and impervious surface made of non-combustible material. The place shall be thoroughly cleaned daily.
- (2) The personal protective equipment like overall, etc. provided for the chlorated workers shall not be taken from the place of work and they shall be thoroughly cleaned daily.
- (3) Adequate quantity of water shall be available near the place of process for use during the emergency.
- (4) Wooden vessels shall not be used for the crystallization of chlorate or to contain crystallized ground chlorate.

5. Special precautions in the use of plant and equipment made from reinforced plastics:-

- (1) All plant and equipment shall conform to appropriate Indian or any other National Standard.
- (2) Care shall be taken during storage, transport, handling and installation of plant and equipment to avoid accidental damage.
- (3) All plant and equipment shall be installed in such a way as to ensure that loads are distributed as intended in design or as per the recommendations of the manufacturers.
- (4) All pipe-work shall be supported so that total loads local to the branches on the vessel or tank do not exceed their design values.
- (5) After erection, all plant and equipment shall be subjected to a pressure test followed by a thorough examination by a competent person. The test and examination shall be as per relevant standard. A certificate of test and examination by competent person shall be obtained and kept available at site.
- (6) All plant and equipment shall be subjected to periodical tests and examination and record maintained as per paragraph 15 in Part II of this Schedule.
- (7) Plant and equipment during their use shall not be subjected to over filling or over loading beyond rated capacity.
- (8) Restrict or prohibit the employment of women and young persons under the age of 18, in any of the processes covered in First Schedule of the Act on, consideration of health and safety of women and young persons.
- (9) Such persons who are restricted or prohibited from working in the process due to the order issued in pursuance of sub-para (1) above shall be provided with alternate work which is not detrimental to their health or safety.

Appendix

(Concerning Special Bathing Accommodation in Pursuance of Para 4 of Part VI)

1. Nitro or amino processes.
2. All chrome processes.
3. Processes of distilling gas or coal tar or processes of chemical manufacture in which tar is used.
4. Processes involving manufacture, manipulation, handling or recovery of cyanogen compound, cyanide compound, cyanate compounds.
5. Processes involving manufacture of bleaching powder or production of chlorine

gas in chloro- alkali plants.

6. Manufacture, manipulation or recovery of nickel and its compounds.
7. All processes involving the manufacture, manipulation or recovery of aliphatic or aromatic compounds or their derivatives or substituted derivatives.

Reaction vessels and kettles:-

- (1) This rule applies to reaction vessels and kettles (hereinafter referred to as "reaction vessels") which normally work at the pressure not above the atmospheric pressure but in which there is likelihood of pressure being created above the atmospheric pressure due to reaction getting out of control or any other circumstances.
- (2) In the event of the vessel being heated by electrical means, a suitable control device shall be provided to prevent the temperature exceeding the safe limit.
- (3) Where steam is used for heating purposes in reaction vessel, it shall be supplied through a suitable automatic device to prevent the maximum permissible steam pressure being exceeded unless the pressure of the steam in the supply line itself cannot exceed the said maximum permissible pressure.
- (4) A suitable safety valve or require disc of adequate size and capacity shall be provided to effectively prevent the pressure being built up in the reaction vessel beyond the safe limit. Effective arrangement shall be made to ensure that the released gases, fumes, vapours, liquids or dusts, as the case may be, are led away and disposed of through suitable pipes without causing any hazard flammable gases or vapours are likely to be vented out from the vessel the discharge end shall be provided with a flame arrester.
- (5) Every reaction vessel shall be provided with a pressure gauge having an appropriate range.
(6) In addition to the device as mentioned in the above clauses, means shall be provided for automatically stopping the feed in to the vessel as soon as process condition deviates from the normal limit to an extent which can be considered as dangerous.
- (7) Where necessary, an effective system for cooling, flooring or blanketing shall be provided for the purpose of controlling the reaction and process conditions within the safe limits of temperature and pressures.
- (8) All automatic auditory and visual warning devices shall be provided for clear warning whenever process conditions exceed the present limits. This device wherever possible shall be integrated without automatic process correction system.
- (9) A notice pointing, out the possible circumstances in which pressure above atmospheric pressure may be built up in the reaction vessel, the dangers involved and the precautions to be taken by the operators shall be displayed at the conspicuous place near the vessel

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