महाराष्ट्र शासन
औद्योगिक सुरक्षा व आरोग्य संचालनालय
कामगार भवन- 5 वा मजला, ई-ब्लॉक, सी-20, रिझर्व्ह बँकेच्या समोर, वांद्रे -कुर्ला संकुल,
वांद्रे (पूर्व), मुंबई -400 051 दुरध्वनी क्र.26572504/09/22/58, फॅक्स नं. 26572474,
ईमेल : dirdish.mum-mh@gov.in website : www.mahadish.in

क्र. संऔसुवआ/निरीक्षण/ 2978 /७अ,
दिनांक : - 6 MAR 2020

परिपत्रक

विषय : संवेदनशील (Critical)रासायनिक अभिक्रिया असणाऱ्या कारखान्यामधील स्फोटाच्या घटना टाळणेकरीता सुरक्षिततेच्या यंत्राणांचा आढावा घेणेबाबत.

प्रस्तावना :

तारापूर औद्योगिक वसाहतीमधील मे. ए.एन.के. फार्मा प्रा.लि. या कारखान्यात तसेच इतर रासायनिक कारखान्यामधील नायट्रेजन, हायड्रोजनेशन, हलोजनेशन, सल्फोनेशन अशा संवेदशनील (Critical) रासायनिक अभिक्रिया असणाऱ्या कारखान्यामध्ये झालेल्या अपघातामध्ये मोठया प्रमाणावर जीवित व वित्तहानी झालेली आहे. असे अपघात टाळणेकरीता संवेदनशील (Critical) रासायनिक अभिकियांशी निगडीत म.का.नि. १९६३ च्या नियम ७३(एच) व इतर सुरक्षा उपाययोजनांचा आढावा तातडीने घेणे आवश्यक आहे.

- **नायट्रेजन, हायड्रोजनेशन, हलोजनेशन, सल्फोनेशन अशा संवेदशनील (Critical) रासायनिक अभिक्रिया सुरु करणेपूर्वीच्या सुरक्षा योजना :-**

Safeguards before the commencement of process.—

1. 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 manufacturing.
2. The design, construction, installation, operation, maintenance of the buildings, plant and facilities shall take into consideration for effective safeguards against all the safety and health hazards so evaluated.

- स्पार्क टाळणेसाठी फ्लेमप्रुफ साधने व इतर :-

In any part of the factory where there is a danger due to fire or explosion from inflammable gas, vapor or dust-

1. No internal combustion engine and no electric motor or other electrical equipment or instrument capable of generating sparks or otherwise causing combustion shall be installed or used in a building engaged in the processes.
2. All electrical fitting shall be of suitable flame-proof construction.
3. Where an inflammable atmosphere is likely to occur the soles of footwear worn by workers shall have no metal on them and the wheels of trucks or conveyors

shall be constructed of non-sparking materials. Adequate precautions taken to prevent the ignition of explosive or inflammable atmosphere by sparks emitted from locomotives or other vehicles operating in the vicinity.

4. Portable electric hand lamps shall not be used unless of an intrinsically safe type and all portable electric tools and appliances connected by flexible wires shall not be used, unless these are of suitable flame-proof construction.
5. No electric arc lamp no naked light fixed or portable, shall be used and no person shall have in his possession any match or any apparatus of any type for producing a naked light or spark and all incandescent electric lights shall be in double airtight covers.
6. Prominent notices in the language understood by the majority of the workers and legible by day and by night, prohibiting smoking, the use of naked lights and the carrying of matches or any apparatus for producing a naked light or spark shall be affixed at the entrance of every room or place where there is the risk of fire or explosion from inflammable liquid gas, vapour or dust. In the case of illiterate workers, the contents of the notices shall be fully and carefully explained to them when they commence work in the factory for the first time and again when they have completed one week of service.
7. A sufficient supply of spades, scrapers and pails made from suitable non-sparking material shall be provided for the use of persons employed in cleaning out and/or removing residence from any chamber, still, tank or other vessels where any inflammable or explosive danger may occur.
8. All machinery and plant, particularly pipe lines, belt-drives, stirer on which static electricity is likely to accumulate shall be effectively earthed. Receptacles for inflammable liquids shall have metallic connections to earthed supply tanks to prevent sparking due to static charge build up.

❖ सुरक्षिततेची उपकरणे व साधनांची तपासणी :-

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 Senior maintenance engineer/Supervisor and 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 daily or as often as it is necessary, to ensure its effective and efficient working at all times.

❖ विद्युत उपकरणे व जोडणी :- **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 explosivity etc. and shall conform to the relevant Indian Standard Institute (ISI) specifications governing their construction and use for that area.

❖ उष्णता व चार्जिंग यांचे यांत्रिकीकरण :-

There shall be an automatic cut-off device of steam supply or other heating devices as well as of further feed to the vessel set to operate, no sooner the critical temperature is reached, beyond which the reaction, if any, in the vessels is likely to get out of control or reach run-away stag

❖ कुलिंग यंत्रणा :- **Cooling arrangement in Emergencies:-**

There shall be arrangement such that it would be possible to introduce quickly, preferably chilled water or at least ordinary cool water circulation in the steam or other heating coils, no sooner the hearing element is cut-off or separate coils or jackets for this purpose shall be provided for the vessel.

❖ अजिटेशन, चार्जिंग व उष्णता यांचे यांत्रिकीकरण :- **Automatic system for Agitator failure and stopping heating, Feed supply :-**

There shall be provided an automatic arrangement such that if the mechanical agitation, where so provided, fails on account of failure of motive power or due to broken shaft, broken blades, failing of blades or such other contingencies, the supply of steam or other heating devices as well as further feed of material would stop automatically.

❖ अलार्म यंत्रणा :- **Alarm Systems**

1. An alarm system shall be provided linked to the pressure indicator of the vessel, so that automatically an audible warning will be given as soon as the pressure exceeds the present safe limit.
2. 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 an outbreak of fire or explosion to occur;
3. Such alarm system shall be checked daily and tested every month at least once to ensure its performance efficiency at all times.

❖ सेफ्टी व्हॉल्, रप्चर डिस्क, लोकल व्हेंट :- **Safety valves, Rupture Disc, local vents :-**

1. Every steel 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.
2. A suitable rupture disc shall be provided on the vessel in addition to the usual spring-loaded safety valve. The pipe duct leading away from the rupture disc shall be taken out of the work-room shall be straight and without any bends in order to minimise resistance at the time of blowing and to avoid any chance of a secondary vapour/air explosion.
3. The vent line of the vessel shall carry a flame-arrestor.

❖ विलगीकरण यंत्रणा :- **Facility for isolation :-**

1. 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 plan 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.

❖ व्हॅक्युम ब्रेक करणे :- **Breaking of vacuum**

If the process is done under vacuum, on account of consideration of special hazards inherent in the process, shall be done only with nitrogen, other suitable inert gas or steam. Compressed air 'connection to the manifolds of the vessel equipment shall be avoided.

❖ इतर उपाययोजना :- Additional safety measures :-

1) Any spillage of material shall be cleaned up without delay.
2) Floors, platforms, stairways, passages and gangways shall be kept free of obstructions.
3) The exit shall be clearly visible and suitably eliminated with suitable arrangement, whatever artificially lightning is to be adopted for this purpose, to maintain the required illumination in case of failure of the normal sources of the electrical supply.
4) Before commencing any experimental work, or any new manufacturing process, all possible steps shall be taken to ascertain definitely all the hazards involved both from the actual operation and the chemical reactions. The properties of the raw materials used, the final products to be made, and any by-products arising during manufacturing, shall be carefully studied and provisions shall be made for dealing with any hazards including effects on workers, which may arise during manufacturing. The design of the building and plant shall be based on the information so obtained.
5) Mobile tank 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.
6) There shall be provisions in the chemical process such that the heating medium shall be automatically controlled at a pre-determined temperature below the danger temperature.
7) Suitable provisions, such as automatic and distant control shall be made for controlling the effects of unduly vigorous or delayed reactions. Automatic flooding or blanketing shall be provided for in the event of an accident.
8) Gravity or pressure feed systems of supplying inflammable materials to the various parts of the buildings or plant shall be fitted with alarm system, automatic cut offs or other devices to prevent overcharging or otherwise endangering the plant.
9) In case of exothermic reactions thermo analytical techniques such as Differential Scanning Calorimetry (DSC) study or Adiabatic calorimetric study shall be carried out to find out onset temperature above which the chemical reaction will become a runaway reaction. The reaction shall be carried out below this temperature.
10) Personal protective equipment's (of Good standard / Quality) as required in the respective MSDS sheet of the chemicals shall be provided to the workers handling the chemicals.
11) No other persons shall be allowed to operate the plant, machinery or equipment unless he has been trained and made thoroughly conversant to handle hazardous substances.
12) Safety officer shall be appointed as per Government Notification No. FAC-2018/ C.R. No.146 /Lab-4, dated 7th March, 2019.

13) List of chemicals (with full name), with storage quantity along with their MSDS sheet shall be made available in the factory.

14) Practicable measures shall be taken to prevent formation of flammable mixture with air where inflammable solvents are used, stored or handled.

15) The site of welding, brazing or any hot work shall be free from any inflammable or explosives solvents, gas and vapour.

These safety measures shall be in addition to and not in derogation of any provisions of the Factories Act or any other rules made there under or of any other Act or Rules.

5/3/2020

डॉ. महेंद्र कल्याणकर (भा.प्र.से.)
संचालक,
औद्योगिक सुरक्षा व आरोग्य,
महाराष्ट्र राज्य, मुंबई.

प्रत :

१) सर्व अपर/सह संचालक,
औद्योगिक सुरक्षा व आरोग्य,
मुंबई / नागपूर / पुणे-१ / पुणे-२/ पुणे-३ / ठाणे / पालघर / कल्याण / रायगड / नाशिक / कोल्हापूर /औरंगाबाद / अकोला.

२) शाखा क्र. ८.