



- II. control quickly and efficiently any outbreak of fire;
- III. bring out a quick and safe evacuation of persons.
- IV. Inform unit/fire station control room, where construction work is carried out within existing operating area.

5.19.2 Combustible materials such as packing materials, sawdust, greasy/oily waste and scrap wood or plastics should not be allowed to accumulate in workplaces but should be kept in closed metal containers in a safe place.

5.19.3 Places where workers are employed should, if necessary to prevent the danger of fire, be provided with:

- I. suitable and sufficient fire-extinguishing equipment, which should be easily visible and accessible;
- II. an adequate water supply at sufficient pressure meeting the requirements of various OISD standards.

5.19.4 To guard against danger at places having combustible material, workers should be trained in the action to be taken in the event of fire, including the use of means of escape.

5.19.5 At sites having combustible material, suitable visual signs should be provided to indicate clearly the direction of escape in case of fire.

5.19.6 Means of escape should be kept clear at all times. Escape routes should be frequently inspected particularly in high structures and where access is restricted.

5.20 LIGHTING

5.20.1 Where natural lighting is not adequate, working light fittings or portable hand-lamps should be provided at workplace on the construction site where a worker will do a job.

5.20.2 Emergency lighting should be provided for personnel safety during night time to facilitate standby lighting source, if normal system fails.

5.20.3 Artificial lighting should not produce glare or disturbing shadows.

5.20.4 Lamps should be protected by guards against accidental breakage.



5.20.5 The cables of portable electrical lighting equipment should be of adequate size & characteristics for the power requirements and of adequate mechanical strength to withstand severe conditions in construction operations.

5.21 PLANT, MACHINERY, EQUIPMENT AND HAND TOOLS

5.21.1 General Provisions

- I. Plant, machinery and equipment including hand tools, both manual and power driven, should:
 - a) be of proper design and construction, taking into account health, Safety and ergonomic principles.
 - b) be maintained in good working order;
 - c) be used only for work for which they have been designed.
 - d) be operated only by workers who have been authorised and given appropriate training.
 - e) be provided with protective guards, shields or other devices as required.
- II. Adequate instructions for safe use should be provided.
- III. Safe operating procedures should be established and used for all plant, machinery and equipment.
- IV. Operators of plant, machinery and equipment should not be distracted while work is in progress.
- V. Plant, machinery and equipment should be switched off when not in use and isolated before any adjustment, clearing or maintenance is done.
- VI. Where trailing cables or hose pipes are used they should be kept as short as practicable and not allowed to create a hazard.
- VII. All moving parts of machinery and equipment should be enclosed or adequately guarded.
- VIII. Every power-driven machine and equipment should be provided with adequate means, immediately accessible and readily identifiable to the operator, of stopping it quickly and preventing it from being started again inadvertently.
- IX. Operators of plant, machinery, equipment and tools should be provided with PPEs, including where necessary, suitable ear protection.

5.21.2 Hand tools

- I. Hand tools should be repaired by competent persons.



- II. Heads of hammers and other shock tools should be dressed or ground to a suitable radius on the edge as soon as they begin to mushroom or crack.
- III. When not in use and while being carried or transported sharp tools should be kept in sheaths, shields, chests or other suitable containers.
- IV. Only insulated or non-conducting tools should be used on or near live electrical installations.
- V. Only non-sparking tools should be used near or in the presence of flammable or explosive dusts or vapours.

5.21.3 Pneumatic Tools

- I. Operating triggers on portable pneumatic tools should be:
 - a) so placed as to minimize the risk of accidental starting of the machine.
 - b) so arranged as to close the air inlet valve automatically when the pressure of the operator's hand is removed.
- II. Hose and hose connections for compressed air supply to portable pneumatic tools should be:
 - a) designed and tested for the pressure and service for which they are intended;
 - b) fastened securely on the pipe outlet and equipped with the safety chain, as appropriate.
- III. Pneumatic shock tools should be equipped with safety clips or retainers to prevent dies and tools from being accidentally expelled from the barrel.
- IV. Pneumatic tools should be disconnected from power and the pressure in hose lines released before any adjustment or repair is made.

5.21.4 Electrical Tools

- I. Low voltage portable electrical tools should generally be used.
- II. All electrical tools should be earthed, unless they are "all insulated" or "double insulated" tools which do not require earthing.
- III. All electrical tools should get inspected and maintained on a regular basis by a competent electrician and complete records kept.

5.21.5 Engines

- I. Engines should:
 - a) be installed so that they can be started safely and the maximum safe speed cannot be exceeded.
 - b) have controls for limiting speed.
 - c) have devices to stop them from a safe place in an emergency.



- II. IC engines should not be run in confined spaces unless adequate exhaust ventilation is provided.
- III. When IC engines are being fuelled:
 - a) the engine should be shut off.
 - b) care should be taken to avoid spilling fuel;
 - c) no person should smoke or have an naked light in the vicinity.
 - d) a fire extinguisher should be kept readily available.
- IV. Secondary fuel reservoir should be placed outside the engine room.

5.22 MISCELLANEOUS

5.22.1 The Contractor shall provide necessary cordoning off barricades and lights to prevent accidents.

5.22.2 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by the Engineer-in-Charge.

5.22.3 All sources of ignition shall be prohibited in areas where flammable liquids are stored, handled and processed. Suitable warning and 'NO SMOKING' signs shall be posted in all such places. Receptacles containing flammable liquids shall be stacked in such a manner as to permit free passage of air between them.

5.22.4 All combustible materials shall be continuously removed from such areas where flammable liquids are stored, handled and processed. All spills of flammable liquids shall be cleared up immediately. Containers of flammable liquids shall be tightly capped.

5.23 REPORTING OF ACCIDENT

5.23.1 All accidents, major or minor must be reported immediately. The Contractor, will provide first aid to the injured person immediately and the injured person shall report to the first aid station along with the 'INJURED ON WORK' form duly filled in and submit to the Officer of the First Aid Station.

5.23.2 Serious Injury

In case of serious injury, the following procedure shall be adopted by the Contractor:

- I. Provide First Aid at his own First Aid Station.
- II. Take the injured person to the Hospital along with the "INJURED ON WORK" form duly filled in.
- III. Reporting the accident to the Owner/Engineer by the Contractor.



5.23.3 Fatal Accident

Fatal accident must be reported immediately to the Engineer/Owner as well as to the Police.

6.0 DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR

6.1 ON AWARD OF CONTRACT

Prior to commencement of work, the Contractor shall submit his Health, Safety and Environment policy and HSE Plans for approval by HPCL. The Contractor shall participate in the pre-start meeting with HPCL to finalize HSE Plans including the following :

- Job procedure to be followed by Contractor for activities covering - Handling of equipment, Scaffolding, Electric Installation etc., describing the risks involved, actions to be taken and methodology for monitoring each activity.
- HPCL/Owner review / audit requirement.
- Organization structure along with responsibility and authority records / reports etc. on HSE activities.

6.2 DURING JOB EXECUTION

Implement approved Health, Safety & Environment management procedure including but not limited to as brought out under above sections. Contractor shall also ensure to:

- a. Arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc., as applicable.
- b. Arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of chemical / explosive materials and their use and implement all precautions mentioned therein.
- c. Timely submission of completed checklist on HSE activities, Monthly HSE report, accident reports, investigation reports etc. as per HPCL requirements. Compliance of instructions on HSE shall be done by Contractor and confirmed immediately to HPCL.
- d. Ensure that Resident Engineer / Site-in-Charge of the Contractor shall attend all the Safety Committee / HSE meetings arranged by HPCL. Only in case of his absence from site that a second senior most person shall be nominated by him in advance and communicated to HPCL.
- e. Display at site office and work locations caution boards, list of hospitals, emergency services available etc.
- f. Provide posters, banners for safe working to promote safety consciousness.
- g. Carryout audits / inspection at sub-contractor works as per approved HSE document and submit the reports for HPCL review.
- h. Assist in HSE audits by HPCL, and submit compliance report.
- i. Generate & submit HSE records / report as per HSE Plan.



- j. Appraise HPCL on HSE activities.

HPCL Engineer in-Charge would monitor and record the safety performance of the contractor during the execution of the job and this performance would be given adequate weightage at the time of renewal of Registration / Vendor Rating.

6.3 TRAINING

General Safety Training to all categories of contractor employees should be imparted before induction and annually thereafter. No person should be allowed to enter the installation without undergoing this training. This training program should cover:

- i) Mandatory uses of PPE like Cotton clothes, Helmet, Safety Shoes, Full Body Safety harness, dust masks, safety goggles, etc.
- ii) Probable Hazards related to industry
- iii) Job specific hazards
- iv) Important Telephone No / Escape route
- v) First Aid
- vi) Use of Fire extinguisher
- vii) Location of assembly points
- viii) Procedure of calling fire crew in case of any emergency
- ix) Wind direction

Yearly training program should be carried out for contractor worker and the records should be maintained. The training program should cover at least the following:

- i) Worker responsibility for safety of himself and work area.
- ii) Associated hazards with the job and job area including electrical shock hazards.
- iii) Importance of First Aid fire-fighting equipment, their use & operations
- iv) Communication system at the installation
- v) Fire / Accident Reporting procedure
- vi) General Safety rules
- vii) Safety Measures during execution of job such as:
 - Welding / Cutting / Grinding
 - Working at height
 - Confined space entry
 - X ray / radiation
 - Erection / Dismantling of scaffolding
 - Tank construction and repairs



- Handling of chemicals etc.
 - Hydrojetting
 - Leak testing of pipelines and equipment (hydro and pneumatic testing)
 - Grit / other methods of blasting for surface preparation blasting etc.
 - Chemical cleaning & pickling
 - Catalyst loading & storage
 - ELCB
- viii) Importance & use of PPE
- ix) Emergency Routes
- x) Assembly Points
- xi) Job Specific Training

7.0 ADDITIONAL GUIDELINES TO BE FOLLOWED FOR PROJECTS IN OPERATIONAL TERMINAL/DEPOT PREMISES AND UNITS WITH HYDROCARBONS

In addition to general safety precautions as outlined above for the activities, following additional safety precautions need to be taken for the sites within the operating area or nearby, where presence of Hydrocarbons cannot be ruled out.

7.1 Police Verification

- Contractor must submit Police Verification of Antecedents of all workmen engaged by for executing jobs within HPCL premises.

NOTE:

- Every person other than HPCL Employee or a casual visitor entering HPCL premises would be governed by the above conditions.
- The term 'Supervisor' would mean any person who oversees the works of a group of Workmen. All other persons will be considered as 'Workmen'.
- Violation of any of the above conditions of Safety would attract penal actions, including termination of the Contract/Registration.
- Meticulous adherence to these requirements would be checked by HPCL.
- All safety precautions, safety norms & safety practices as required by the Terminal/Depot shall be followed by the contractor and his workers. All safety/ security/ statutory requirements have to be strictly adhered to by the Contractor and his employees.



7.2 Compliance to Work Permit System

- No job shall be carried out without a valid permit. Permit should be in line with OISD-STD-105 "Work Permit System".
- Provisions as mentioned in OISD-STD-105 have to be strictly adhered to and records maintained.
- Do not carry out any work without valid Work Permit issued by the authorized person in the HPCL premises as per Work Permit System.
- Comply with all the Fire/Safety/Excavation/Radiography Permit conditions specified in the Permit and clearances given from time to time.
- Display Permit at Worksite for random checking by the HPCL officials.

7.3 Smoking Regulation

- i) Smoking should be prohibited in all places containing readily combustible or flammable materials and "No Smoking" notices be prominently displayed. Smoking is strictly prohibited inside Terminal/Depot premises. Match box, cigarette lighters, cigarettes, bidis, any other inflammable materials are not permitted inside Terminal/Depot and have to be deposited with the Security before entering the premises.

7.4 General Safety Precautions, Fire Fighting Equipment, Emergency Preparedness

- Fire-extinguishing equipment should be well maintained and inspected at suitable intervals by a competent person. Access to fire-extinguishing equipment such as hydrants, portable extinguishers and connections for hoses should be kept clear at all times.
- All supervisors and workers should be trained in the use of fire extinguishing equipment, so that adequate trained personnel are readily available during all working periods.
- Audio means to give warning in case of fire should be provided where this is necessary to prevent danger. Such warning should be clearly audible in all parts of the site where persons are liable to work. There should be an effective evacuation plan so that all persons are evacuated.
- Notices should be posted at conspicuous places indicating:
 - (a) the nearest fire alarm;
 - (b) the telephone number and address of the nearest emergency services.
- The work site shall be cleared of all combustible materials, as sparks and molten metal coming from the welding job can easily ignite combustible materials near or below the



welding site. If the combustible materials cannot be removed from the area, the same shall be properly shielded.

- Adequate number of dry chemical type fire extinguishers (DCP) shall be made available in the work area. Also fire protection facilities like running hoses etc. as per permit should be complied with.
- Wherever required, welding screens shall be put up to protect other equipment in adjoining areas against flying sparks. Material used should be metal / fire proof blanket / water curtain.
- Welding or cutting of vessels / equipment used in Hydrocarbon / hazardous flammable chemicals shall be done after ensuring hydrocarbon free area and verifying the same with the suitable hydrocarbon detector.
- The confined space / equipment shall be made gas free (hydrocarbon and toxic) and cleaned and the same shall be ensured with the help of suitable gas detectors.
- Adequate precautions against pyrophoric material shall be ensured.
- **Non-sparking tools must be used while carrying out work in hazardous areas.**
- In confined spaces and other places where flammable gases, vapours or dusts can cause danger, following measures should be taken:
 - (a) only approved type electrical installations and equipment, including portable lamps, should be used;
 - (b) there should be no naked flames or source of ignition;
 - (c) oily rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place;
 - (d) Air operated ventilation system should be provided.

7.5 **Mobile Regulation**

Mobile phones are strictly prohibited inside licenced premises. Any person found with mobile phone inside licenced premises shall be suspended from entering the premises with immediate effect. Mobiles have to be deposited with the Security before entering the premises.

7.6 **Traffic Safety**

- Contractor's drivers must get themselves familiarized with HPCL roads and traffic regulations on certain roads.
- Only vehicles with diesel engines fitted with PESO approved and certified spark arrestors are allowed to enter the premises.
- All vehicles entering or leaving the HPCL must stop at the security gates, for checking by the security personnel.
- **The maximum speed limit for vehicles within the premises is 10 KMPH.**



- Anyone driving a motor vehicle must be in possession of a valid driving license for that class of vehicle.
- Transport vehicles permitted inside the HPCL premises shall be parked in the designated parking areas only.
- Contractor's employees will use designated HPCL entrance and will proceed directly to the contractor's job site by way of HPCL roads. They shall not pass through HPCL operating area.
- Contractor's employees should not wander from their job site, nor loiter around HPCL operating units, control houses etc.
- Vehicles or other mobile equipment shall not be parked in any manner that will block fire hydrants, fire equipment, building exits, walkways etc.
- It shall be the responsibility of the contractor to ensure that materials are properly stacked in the transport vehicles to avoid items dropping from the vehicles while in transit.
- Bicycles can be used inside HPCL premises on need basis. However, pillion rider on bicycles is not permitted.
- Crane Operator should not allow anybody to sit on vehicle body.
- Transportation of contract personnel not permitted by goods carrier like Tractor trolley, forklift, Dumper etc.

8.0 WORK PERMIT SYSTEM

8.1 INTRODUCTION

The objectives of the Work Permit System are to exercise control over the construction activities by assigning responsibilities, ensuring clear cut communication between interested functions & safety considerations to the job, its hazards & the precautions required. It ensures that the work is properly defined & authorized and project personnel are aware what is going on, precautions to be taken are specified and the persons executing the job understand the nature and extent of hazards involved.

Work Permit System is an important element of safety management system and implementation of this in true spirit shall help in ensuring a safe working environment, thereby reducing possibility of injury to personnel, protect property, avoid fire, explosion & adverse effect on environment.



8.2 WORKS THAT MAY REQUIRE PERMIT

Normally all maintenance, repair, construction work shall be carried out with a proper work permit. The nature of jobs requiring work permits and the formats shall be as stipulated by the owner / Site In-charge.

Some of the activities that normally require work permits are mentioned below :

- Construction
- Demolition
- Welding work
- Working in confined space
- Work at height
- Electrical Work
- Erection and dismantling of scaffold
- Radiography

8.3 TYPES OF WORK PERMITS / CLEARANCES

8.3.1 ELECTRICAL CONNECTION & WELDING CLEARANCE PERMIT

This permit covers provision of safe electrical connections.

8.3.2 WORKING AT HEIGHT

This permit covers safe access/platform/working arrangement at height for carrying out the job. The permit shall be issued after checking the Pre-erection Checklist for Scaffolds.

Before erection, when scaffold materials are kept at site of erection, "Pre Erection Checklist for Scaffold" shall be carried out in prescribed format.

All tubular scaffolds need to be checked and certified before being used.

Workmen required to work at height should submit requisite medical certificate.

8.3.3 RADIOGRAPHY CLEARANCE

This permit authorizes radiography of weld joints.



8.4 GENERAL REQUIREMENTS OF WORK PERMIT

- 8.4.1 Permits and clearances shall be in printed forms, in duplicate or triplicate, depending on nature of job, serially numbered, Format Number and different colour code should be adopted for different types of permits and clearances. Where ever Online Work Permit System of HPCL is available, the same shall be used for issuance of work permits.
- 8.4.2 Duly signed "Dos and Don'ts" for related jobs shall be attached with each permit and safety guidelines mentioned shall be complied at work site.
- 8.4.3 Depending on nature of jobs, type of permit required shall be decided.
- 8.4.4 In case of Permit for working at heights, the following is to be ensured:
- I. All tools should be carried in tool kits to avoid their falling.
 - II. Throwing or dropping of material / equipment from height is prohibited.
 - III. Avoid jumping from one member to another of a structure. Use proper passageway.
 - IV. Both hands should be free, while climbing the ladder. Bypassing the steps of ladder should be avoided.
 - V. Avoid movements on overhead beam without proper fall protection.
- 8.4.5 For Radiation Permit jobs, the following shall be ensured:
A warning or protective barricade of 1 m height should be provided around the surrounding area, meeting the distance requirement as mentioned in permit and radiation signs & symbols to be displayed prominently by the Permit Receiver.
- 8.4.6 Permit issuing authority shall satisfy that permit conditions are met before issuing permit. It is also to be ensured that permit conditions are maintained in course of execution of the job.
- 8.4.7 All concerned shall be trained on Work Permit System for proper implementation. One day training shall be mandatory for signatory of permit and further, he shall attend a refresher course at a gap not exceeding 2 years. Project Head shall keep a record of such trainings and ensure that no untrained person is signing the permit. He shall also initiate action in advance to train the person, whose validity is expiring.

8.5 SURRENDERING OF WORK PERMIT

On completion of a work, the permits (original with copies) shall be signed by the receiver and returned to the issuer. The issuer shall retain the copies of various permits in chronological order in a folder for a period of minimum 3 months from the date of closure of permit or from the date of commissioning of facilities, whichever comes later.



In case of serious lapse or violation of permit conditions, where safety of the working personnel or equipment is likely to be affected, the execution of the job can be stopped by permit issuing authority or any other personnel authorized by the management for the purpose.

In case of any accident or fire at the work site, the permit shall get automatically cancelled. Fresh permit shall be obtained for restarting the job.

8.6 SURVEILLANCE AND WITHDRAWAL OF PERMIT

The permit issuing authority and executing authority shall inspect the work site frequently to ensure that permit conditions are being complied and maintained.

Officers shall make surprise checks at the sites where jobs against work permit are in progress. Surprise checks shall be carried out on a structured checklist and findings shall be documented. Date and time of such surprise checks shall be recorded. The corrective measures shall also be taken.

The permit can be withdrawn by issuing authority or any person authorized by management in case of violation of permit condition, Site emergency or any other unsafe situation.

8.7 TRAINING AND AWARENESS

Any person who is authorized to issue or receive the work permit shall be imparted training for a period of not less than one day covering various aspects of work permits' system. Further all the persons authorized to issue/ receive the work permit shall be given a minimum of one day training once in a year on the work permit system and records maintained.

Training and awareness programs are to be organized from time to time for issuer & receiver of permit to make them conversant about work permit system. These programs should include "class room" as well as "on the job training" like

- Filling of permits, assessing hazards and correction, Work Permit procedure
- Atmosphere monitoring with portable gas testers.
- Use of PPE including SCBA & airline respirators
- Carrying out different jobs safely

Awareness programs should be arranged in the form of "Class room training" as well as "On the job training" for contractors (Supervisor and their workmen) about work permit system.



8.8 REVIEW

Review of work permit system shall be carried out at least once in two years or following a major and/or high-potential incident / accidents or change in statutory requirements / norms.

8.9 AUDIT OF WORK PERMIT SYSTEM

The Work Permit System shall be audited at least annually by a multi-disciplinary team constituted by management for the purpose. For the audit, detailed format shall be developed by the Department. The audit shall include checking of procedure for permit / clearances being followed and physical check at site. The guidelines for audit checklist are as follows:

- The permit, clearances and format have been properly filled up and recommendations are mentioned categorically.
- The permit signatories are trained and they have been trained within 2 years. Check the content of training program to assess the coverage on "Work Permit System". Ask questions from workmen, supervisors, and signatories of permit about their knowledge on subject to assess the effectiveness of training program.
- Check for training record of toolbox talk and effectiveness of training.
- Check for detailed procedure including closing of permits, record keeping.
- Check work sites to observe deviation from procedures, permits, clearances and format.

8.9.1 Safety Meeting

Action points related to safety issues related to the project is discussed. Weekly meeting shall be conducted by contractors for the entire work force.

8.10 Pre-Job Meeting / Pep talks

The Pre-Job Meeting is meant for consultation before start of activity. At this meeting the "pre-job checklist" shall be handed over and worked out with all persons involved.

- These are meant for developing safety awareness and to remind the various safety measures and rules to be followed by the working group
- During the talk, the safety precautions for various activities and general HSE rules would be highlighted.
- Ensure active participation, interaction of workmen and encourage them to share their similar experiences of other sites
- The records of Pep talks are to be maintained and a copy of the same is to be sent to Project Head/HQO.



8.11 Tool Box Meetings

Toolbox meetings are a kind of consultation wherein executing employees will be informed about the actual work. A toolbox meeting is a medium to inform executing employees.

- The meetings will be organized by Contractors/Sub-contractors at their respective work locations daily.
- The meeting would be held with the concerned staff / workmen involved in the specific job. In the meeting the safety measures and the procedures to be adopted would be conveyed to all concerned after discussing/assessing associated risks prevailed in the work activity.
- The meeting would be held on need basis and conducted by Site Engineer/Foremen/EHS coordinator as and when changes of procedure/machinery and for new teams.
- The records of Tool Box meetings are to be maintained and a copy of the same is to be sent to Project Head.

9.0 NON COMPLIANCE OF SAFETY AND HEALTH PROVISIONS

The compliance of the Safety and Health provisions are of utmost importance. HSE Manager/Officer, HPCL has the right to order stoppage of work till rectification is carried out to the satisfaction of HSE Manager/Officer. All stoppage on this account will be at the entire risk cost and consequence of the erring individuals/contractors.

9.1 DISCIPLINARY ACTION

Non-compliance of Safety and Health and Environmental provisions will result in disciplinary action as given below:

Violations	Action
First instance	Written warning & monetary penalty of Rs. 1000 /-
Second instance	Written warning & monetary penalty of Rs. 5000 /-
Third instance	Removal from site



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- In case of unsafe conditions, the work will be immediately suspended till safe conditions are restored / safety compliance is ensured.
- In case of unsafe acts by individuals (for eg. not wearing PPEs etc.), the person will not be allowed to work till the compliance is ensured.
- In case any person brings himself or others in direct life threatening situations or where he/she creates a large material loss, the offender will be immediately removed from the Site
- The contractor who regularly, repetitively violates the provisions will be removed from the site.

9.2 PENALTIES

All contractors working for HPCL have to strictly follow safety norms as per rules and regulations. Contractors who violate safety norms while executing the job will be penalized.

Safety violations can be reported by Safety Engineer (HPCL), Safety Supervisor (contractor), HPCL personnel, Inspecting authorities or any person working at the site. All Safety violations shall be reported to the Location in- charge / Project In-charge.

Penalties for violation / non -adherence of various safety norms are given below:

PENALTY CLAUSE	SAFETY VIOLATION TYPE	PENALTY
1	Non-usage of PPEs like Safety helmet / Safety shoes / Safety goggles / safety gloves / Face Shield / Respiratory protection etc. by the contractor personnel.	As per 10.1
2	Working without valid work permit / Violation of any of the conditions specified in the permit / JSA.	Work to be suspended till issuance of Work Permit. First instance : Written Warning & penalty of Rs. 10,000 /- Second instance : Written warning & penalty of Rs. 20,000 /- Third instance : Removal from site



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3	Carrying out electrical jobs by un-authorized person / Non deployment of the licensed electricians for electrical job.	As per 10.1
4	Non-usage of safe electric practices at work site : <ul style="list-style-type: none">- non-installation of ELCB,- not providing earthing connections for electrical appliances,- not providing emergency isolation switches,- using poor joints of cables,- using naked wire without top plug into socket,- laying wire / cables on the roads etc.	As per 10.1
5	Working at heights without safety belt / Non-usage of the full body safety harness and fall back arrester with life line properly anchored by the workers while working at height	As per 10.1
6	Non-standard / unsafe platform/ladder, Non-standard / unsafe Scaffolding, not having proper arrangement for fall protection, not providing safety nets etc.	As per 10.1
7	Throwing up/down any material from height or not making proper provision to bring down material safely from height	As per 10.1
8	Unsafe handling of compressed gas cylinders : <ul style="list-style-type: none">- no trolley, jubilee clips, double gauge regulator- improper storage / handling- keeping compressed gas cylinders in horizontal position etc.	As per 10.1
9	Non fencing / barricading of excavated areas. Unsatisfactory fencing / barricading of excavated areas, Not providing proper shoring /strutting /proper slope and Not keeping the excavated earth at least 1.5 meter away from excavated area	First instance : Written warning & penalty of Rs. 20,000 /- Second instance : Removal from site
10	Use of domestic LPG for cutting purpose	Rs. 1000 /- per instance
11	<ul style="list-style-type: none">- Usage of untested and uncertified pressure vessel.- Usage of untested and uncertified lifting tools/tackle.	Rs. 5000 /- per instance
12	Not providing sufficient illumination / ventilation at the work site, including confined spaces	Rs. 5000 /- per instance



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13	<ul style="list-style-type: none">- Driving without valid license- Over speeding of vehicles- Driving vehicles without PESO approved and certified spark arrestors within working locations- Un-authorized road closure / blockage- rash driving / overtaking within working locations- wrong parking- parking the vehicles at non-designated places inside premises- parking in front of any fire-fighting equipment etc.	First instance : Written Warning & penalty of Rs. 10,000 /- Second instance : Written warning & penalty of Rs. 20,000 /- Third instance : Removal from site
14	Riding on material handling vehicles or trolleys or hydra.	As per 10.1
15	Non-display of name board, permit, etc. at site	Rs. 500/- per instance
16	Non-deployment of safety supervisor / supervisor responsible for safety at work site	Rs. 5000/- per week or part thereof
17	Failure to maintain safety register and record by Contractor Safety Supervisor or Supervisor responsible for safety.	Rs. 1,000/- per week or part thereof
18	Failure to submit monthly safety report by the 5th of the next month to the Engineer-in-Charge	Rs. 1,000/- per week or part thereof
19	Failure to adhere to the incident reporting system	Rs. 10,000/- per instance



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10.0 CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES

ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
(A) EXCAVATION Pit Excavation upto 3.0m	Falling into pit	Personal injury	Provide guard rails/ barricade with warning signal Provide at least two entries/ exits. Provide escape ladders.
	Earth Collapse	Suffocation/ Breathlessness Buried	Provide suitable size of shoring and strutting, if required. Keep soil heaps away from the edge equivalent to 1.5m or depth of pit whichever is more. Dont allow vehicles to operate too close to excavated areas. Maintain at least 2m distance from edge of cut. Maintain sufficient angle of repose. Provide slope not less than 1:1 and suitable bench of 0.5m width at every 1.5m depth of excavation in all soils except hard rock. Battering/benching the sides.
	Contact with buried electric cables Gas / Oil Pipelines	Electrocution Explosion	Obtain permission from competent authorities, prior to excavation. Locate the position of buried utilities by referring to plant drawings. Start digging manually to locate the exact position of buried utilities and thereafter use mechanical means.
Pit Excavation beyond 3.0m	Same as above plus Flooding due to excessive rain / underground water	Can cause drowning situation	Prevent ingress of water Provide ring buoys Identify and provide suitable size dewatering pump or well point system
	Digging in the vicinity of existing Building / Structure	Building/Structure may collapse Injury / loss of property	Obtain prior approval of excavation method from local authorities. Use under-pinning method. Construct retaining wall side by side.
	Movement of vehicles/ equipment close to the edge of cut.	May cause cave-in or slides. Persons may get buried.	Barricade the excavated area with proper lighting arrangements. Maintain at least 2m distance from edge of cut and use stop blocks to prevent over-run. Strengthen shoring and strutting.



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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
Narrow deep excavations for pipelines, etc.	Same as above plus Frequent cave-in or slides	May cause severe injuries or prove fatal	Battering/benching of sides. Provide escape ladders.
	Flooding due to Hydro- static testing	Drowning situation may arise	Same as above plus Bail out accumulated water. Maintain adequate ventilation.
Rock by excavation blasting	Improper handling of explosives	May prove fatal	Ensure proper storage, handling & carrying of explosives by trained personnel. Comply with the applicable explosive acts & rules.
	Uncontrolled explosion	May cause severe injuries or prove fatal	Allow only authorized persons to perform blasting operations. Smoking and open flames are to be strictly prohibited.
	Scattering of stone pieces in atmosphere	Can injure people	Use PPE like goggles, face mask, helmets etc.
Rock excavation by blasting (Contd.)	Entrapping of persons / animals.	May cause severe injuries or prove fatal	Barricade the area with red flags and blow siren before blasting.
	Misfire	May explode suddenly	Do not return to site for at least 20 minutes or unless announced safe by designated person.
Piling Work	Failure of pile - driving equipment	Can injure people	Inspect Piling rigs and pulley blocks before the beginning of each shift.
	Noise pollution	Can cause deafness and psychological imbalance.	Use personal protective equipment like ear plugs, muffs, etc.
	Extruding rods/casing	Can injure people	Barricade the area and install sign boards.
	Working in the vicinity of 'Live-Electricity'	Can cause electrocution / Asphyxiation	Keep sufficient distance from Live-Electricity as per IS code. Shut off the supply, if possible. Provide artificial/rescue breathing to the injured.
(B) CONCRETING	Air pollution by cement	May affect Respiratory System	Wear respirators or cover mouth and nose with wet cloth.
	Handling of ingredients	Hands may get injured	Use gloves & other PPE.



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	Protruding reinforcement rods.	Feet may get injured	Provide platform above reinforcement for movement of workers.
	Earthing of electrical mixers, vibrators, etc. not done.	Can cause electrocution/ asphyxiation	Ensure earthing of equipment and proper functioning of electrical circuit before commencement of work.
	Falling of materials from height.	Persons may get injured	Use hard hats. Remove surplus material immediately from work place. Ensure lighting arrangements during night hours.
	Continuous pouring by same gang	Results in fatigue and may lead to accident.	Insist on shift operation. Provide adequate rest to workers between subsequent pours.
	Revolving of concrete mixer/ vibrators	Parts of body or clothes may get entrapped.	Allow only mixers with hopper. Provide safety cages around moving parts. Ensure proper mechanical locking of vibrator.
Super-structure	Same as above plus Deflection in props or shuttering material	Shuttering/props may collapse and prove fatal	Avoid excessive stacking on shuttering material. Check the design and strength of shuttering material before commencement of work. Rectify immediately the deflection noted during concreting.
	Passage to work place	Improperly tied and designed props/planks may collapse	Ensure the stability and strength of passage before commencement of work. Do not overload and stand under the passage.
(C) REINFOR- CEMENT	Curtailment and binding of rods	Persons may get injured	Use PPE like gloves, shoes, helmets, etc. Avoid usage of shift tools.
	Carrying of rods for short distances/at heights	Persons may get injured (hand & shoulders)	Provide suitable pads on shoulders and use safety gloves. Tie up rods in easily liftable bundles. Ensure proper staging.
	Checking of clear distance / cover with hands	Rods may cut or injure the fingers	Use measuring devices like tape, measuring rods etc.
	Hitting projected rods and standing on cantilever rods.	Persons may get injured and fall down	Use safety shoes and avoid standing unnecessarily on cantilever rods. Avoid wearing of loose clothes.
	Falling of material from height	May prove fatal	Use helmets. Provide safety nets.



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	Transportation of rods by trucks/ trailers	Protruded rods may hit the persons	Use red flags/lights at the ends. Do not protrude the rods in front of or by the side of drivers cabin. Do not extend the rods beyond 1/3 rd of deck length or 1.5m whichever is less.
(D)WELDING AND GAS CUTTING	Welding radiates invisible ultraviolet and infra-red rays	Radiation can damage eyes and skin.	Use specified shielding devices and other PPE of correct specifications. Avoid Thoriated Tungsten electrodes for GTAW
	Improper placement of oxygen and acetylene cylinders	Explosion may occur	Move out any leaking cylinders Keep cylinders in vertical position. Use trolley for transportation of cylinders and chain them. Use flashback arrestors.
	Leakage/ cuts in hoses	May cause fire	Purge regulators immediately and then turn off. Never use grease or oil on oxygen line connections and copper fittings on acetylene lines. Inspect gas carrying hoses regularly. Always use red hose for acetylene & other fuel gases and black for oxygen.
	Opening-up of cylinder	Cylinder may burst	Always stand back from the regulator while opening the cylinder. Turn valve slowly to avoid bursting. Cover the lug terminals to prevent short circuiting.
	Welding of tanks, container or pipes storing flammable liquids	Explosion may occur	Empty & purge them before welding. Never attach the ground cable to tanks, container or pipe storing flammable liquids. Never use LPG for gas cutting.
(E) RADIOGRAPHY	Ionizing Radiation	Radiation may react with the skin and can cause cancer, skin irritation, dermatitis, etc.	Ensure Safety regulations as per BARC / AERB before commencement of job. Cordon off the area and install Radiation warning symbols. Restrict the entry of unauthorized persons. Wear appropriate PPE and film badges issued by BARC / AERB.



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	Transportation and Storage of Radiography source	Same as above	<p>Never touch or handle radiography source with hands.</p> <p>Store radiography source inside a pit in an exclusive isolated storage room with lock and key arrangement. The pit should be approved by BARC / AERB.</p> <p>Radiography source should never be carried either in passenger bus or in a passenger compartment of trains.</p> <p>BARC / AERB has to be informed before source movement.</p> <p>Permission from Director General of Civil Aviation is required for booking radio isotopes with airlines.</p>
	Loss of Radio isotope	Same as above	<p>Try to locate with the help of Survey Meter.</p> <p>Inform BARC / AERB</p>
(F) ELECTRICAL INSTALLATION AND USAGE	Short circuiting	Can cause Electrocutation or Fire	<p>Use rubberized hand gloves and other PPE.</p> <p>Don't lay wires under carpets, mats or doorways.</p> <p>Allow only licensed electricians to perform on electrical facilities.</p> <p>Use one socket for one appliance.</p> <p>Ensure usage of only fully insulated wires or cables.</p> <p>Don't place bare wire ends in a socket.</p> <p>Ensure earthing of machineries and equipment.</p> <p>Do not use damaged cords and avoid temporary connections.</p> <p>Use spark-proof flame proof type field distribution boxes.</p> <p>Do not allow open/bare connections.</p> <p>Provide all connections through ELCB.</p> <p>Protect electrical cables/equipment from water and naked flames.</p> <p>Check all connections before energizing.</p>
	Overloading of Electrical System	Bursting of system can occur which can lead to fire	<p>Display voltage and current ratings prominently with 'Danger' signs.</p> <p>Ensure approved cable size, voltage grade and type.</p> <p>Switch off the electrical utilities when not in use.</p> <p>Do not allow unauthorized connections.</p> <p>Ensure proper grid wise distribution of Power.</p>



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	Improper laying of overhead and underground transmission lines/cables	Can cause electrocution and prove fatal	Do not lay un-armoured cable directly on ground, wall, roof of trees. Maintain at least 3m distance from HT cables. All temporary cables should be laid at least 750 mm below ground on 100 mm fine sand overlying by brick soling. Provide proper sleeves at crossings/ inter-sections. Provide cable route markers indicating the type and depth of cables at intervals not exceeding 30m and at the diversions/termination.
(G) FIRE PREVENTION AND PROTECTION	Small fires can become big ones and may spread to the surrounding areas	Cause burn injuries and may prove fatal	In case a fire breaks out, press fire alarm system and shout "Fire, Fire". Keep buckets full of sand & water/ fire extinguishing equipment near hazardous locations. Confine smoking to 'Smoking Zones' only. Train people for using specific type of fire fighting equipment for different classes of fire. Keep fire doors/shutters, passages and exit doors unobstructed. Maintain good housekeeping and first-aid boxes Don't obstruct access to Fire extinguishers. Do not use elevators for evacuation during fire. Maintain lightning arresters for elevated structures. Stop all electrical motors with internal combustion. Move the vehicles from dangerous locations. Remove the load hanging from the crane booms. Remain out of the danger areas.
	Improper selection of Fire extinguisher	It may not extinguish the fire	Ensure usage of correct type of fire extinguisher meant for the specified fire. Do not attempt to extinguish Oil and electric fires with water. Use foam cylinders/C0 ² /sand or earth.



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	Improper storage of highly inflammable substances	Same as above	Maintain safe distance of flammable substances from sources of ignition. Restrict the distribution of flammable materials to only minimum necessary quantity. Construct specifically designed fuel storage facilities. Keep chemicals in cool and dry place away from heat. Ensure adequate ventilation. Before welding operation, remove or shield the flammable material properly. Store flammable materials in stable racks, correctly labeled preferably with catchment trays. Wipe off the spills immediately.
(H) VEHICULAR MOVEMENT	Crossing the Speed Limits (Rash driving)	Personal injury / Accidents	Strictly adhere to the speed limits and traffic rules. Always expect the unexpected and be a defensive driver. Use seat belts/helmets. Blow horn at intersections and during overtaking operations. Maintain the vehicle in good condition. Do not overtake on curves, bridges and slopes. Do not force the driver to drive fast and round the clock. Do not day dream while driving.
	Adverse weather condition	Same as Above	Read the road ahead and ride to the left. Keep the wind screen and lights clean. Do not turn at speed. Recognize the hazard, understand the defense and act correctly in time.
	Consuming alcohol before and during the driving operation	Same as above	Alcohol and driving do not mix well. Either choose alcohol or driving. If you have a choice between hitting a fixed object or an on-coming vehicle, hit the fixed object. Quit the steering at once and become a passenger. Take sufficient rest and then drive.
	Falling objects/ Mechanical failure	May prove fatal	Ensure effective braking system, adequate visibility for the drives, reverse warning alarm. Proper maintenance of the vehicle as per manufacturer instructions.