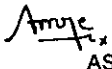
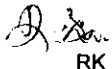


SPEC. FOR HEALTH, SAFETY AND  
ENVIRONMENT MANAGEMENT, SAFETY  
MEASURES FOR ELECTRICAL  
INSTALLATIONS DURING  
CONSTRUCTION

[ANNEXURE-X TO SPECIAL CONDITIONS OF CONTRACT]

# निर्माण स्थल पर स्वास्थ्य, सुरक्षा एवं पर्यावरण प्रबंधन मानक विनिर्देशन

## STANDARD SPECIFICATION FOR HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT AT CONSTRUCTION SITES

| 4       | 13/02/2008 | REVISED & UPDATED                |  |  |  |  |
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|         |            |                                  |                                                                                     |                                                                                       | Approved by                                                                           |                                                                                       |

### Abbreviations:

|      |   |                                                                |
|------|---|----------------------------------------------------------------|
| AERB | : | Atomic Energy Regulatory Board                                 |
| ANSI | : | American National Standards Institute                          |
| BARC | : | Bhabha Atomic Research Centre                                  |
| BS   | : | British Standard                                               |
| EIL  | : | Engineers India Limited                                        |
| ELCB | : | Earth Leakage Circuit Breaker                                  |
| EPC  | : | Engineering, Procurement and Construction                      |
| EPCC | : | Engineering, Procurement, Construction and Commissioning       |
| ESI  | : | Employee State Insurance                                       |
| GCC  | : | General Conditions of Contract                                 |
| GM   | : | General Manager                                                |
| GTAW | : | Gas Tungsten Arc Welding                                       |
| HOD  | : | Head of Department                                             |
| HSE  | : | Health, Safety & Environment                                   |
| HV   | : | High Voltage                                                   |
| IS   | : | Indian Standard                                                |
| IE   | : | Indian Electricity                                             |
| LPG  | : | Liquefied Petroleum Gas                                        |
| LSTK | : | Lump Sum Turn Key                                              |
| MV   | : | Medium Voltage                                                 |
| PPE  | : | Personal Protective Equipment                                  |
| RCM  | : | Resident Construction Manager or Site-in-Charge, as applicable |
| ROW  | : | Right of Way                                                   |
| SCC  | : | Special Conditions of Contract                                 |
| SLI  | : | Safe Load Indicator                                            |
| TBM  | : | Tool Box Meeting                                               |

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## **1.0 SCOPE**

This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied by Contractors including their sub-contractors during construction.

This specification is not intended to replace the necessary professional judgement needed to design & implement an effective HSE system for construction activities and the contractor is expected to exceed requirements given in this specification.

Requirements stipulated in this specification shall supplement the requirements of HSE Management given in relevant Act(s)/legislations, General Conditions of Contract (GCC), Special Conditions of Contract (SCC) and Job (Technical) Specifications. Where different documents stipulate different requirements, the most stringent shall apply.

## **2.0 REFERENCES**

The document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Building and other construction workers (regulation of employment and condition of service) Act, 1996
- Job (Technical) specifications
- Relevant International/ National Codes (refer Appendix-A for standards/codes on HSE)
- Statutory requirements

## **3.0 REQUIREMENTS OF HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS**

### **3.1 MANAGEMENT RESPONSIBILITY**

#### **3.1.1 HSE Policy & Objectives**

The Contractor should have a documented HSE policy & objectives to demonstrate commitment of their organization to ensure health, safety and environment aspects in their line of operations.

#### **3.1.2 Management System**

The HSE management system of the Contractor shall cover the HSE requirements including but not limited to what is specified under clause 1.0 and 2.0 above.

#### **3.1.3 Indemnification**

Contractor shall indemnify & hold harmless, Owner/EIL & their representatives, free from any and all liabilities arising out of non-fulfillment of HSE requirements.

#### **3.1.4 Deployment & qualifications of safety personnel**

Contractor shall designate/ deploy all the categories of HSE personnel at site as indicated below:

- a) Safety Steward

One for every 500 workers or part thereof. He/She shall possess minimum one year of experience in construction work environment.

b) **Safety Supervisor**

One for every 1000 workers or part thereof. He/She shall possess minimum two years of work experience in construction work environment.

c) **Safety Officer**

One for every 1000 workers or part thereof. He/She shall possess a recognized Degree in any branch of engineering or technology or architecture and had a post qualification construction experience of minimum two years or possess a recognized Diploma in any branch of engineering or technology and had a post qualification construction experience of minimum five years.

In addition, he/she shall also possess a recognized degree or diploma in industrial safety and preferably have adequate knowledge of the language spoken by majority of the workers at the construction site.

In case the statutory requirements i.e. Centre or State Acts and/ or Rules as applicable like the Building and Other Construction Workers -Regulation of Employment and Conditions of Service- Act or Rules wherever notified, the Factories Act or Rules wherever notified, etc. are more stringent than above, the same shall be followed.

The Contractor shall ensure physical presence of safety personnel at each work location where Hot work permit is required. No work shall be started at site until above safety personnel are physically present at site. The contractor shall submit a safety organogram clearly indicating the lines of responsibility and reporting system and elaborate the responsibilities of safety personnel in the HSE Manual/Programme. The contractor shall furnish Bio-Data/ Resume/ Curriculum Vitae of the safety personnel as above, at least 1 month before the mobilization, for EIL/Owner's approval.

**3.1.5 Implementation & Monitoring**

Contractor shall be fully responsible for planning, reporting, implementing and monitoring all HSE requirements and compliance of all laws & statutory requirements. The Contractor shall also ensure that the HSE requirements are clearly understood & faithfully implemented at all levels at site.

**3.1.6 Awareness**

The contractor shall brief the visitors about the HSE precautions which are required to be taken before proceeding to site and make necessary arrangements to issue appropriate PPEs like hard hats & safety shoes to his visitors.

The Contractor shall promote and develop consciousness about Health, Safety and Environment among all personnel working for the Contractor. Regular awareness programmes and fabrication shop/work site meetings atleast on monthly basis shall be arranged on HSE activities to cover hazards involved in various operations during construction. During the awareness programme, steps shall be taken by the contractor to motivate & encourage the workmen & supervisory staff by issuing/ awarding them with the tokens/ gifts/ mementos/ monetary incentives.

A verbal warning shall be given to the worker during the first HSE violation. A written warning shall be issued on the second violation and thereafter for the third violation; the services of the worker shall be terminated. For all these violations, penalties shall be imposed separately on the contractor. A record of warnings for each worker shall be maintained by the contractor like by punching their cards.

### **3.1.7 Fire prevention & First-Aid**

The contractor shall arrange suitable first aid measures such as First Aid Box (Refer Appendix-B for details), trained personnel to administer First Aid, stand-by ambulance or vehicle and install fire protection measures such as adequate number of steel buckets with sand & water and adequate number of appropriate fire extinguishers (Refer Appendix-C for details) to the satisfaction of EIL/Owner. The contractor's safety personnel shall be trained enough to carry out above activities effectively so as to provide immediate relief in case of an emergency.

In case the number of workers exceeds 500, the Contractor shall position an ambulance/ vehicle on full time basis very close to the worksite.

### **3.1.8 Documentation**

The Contractor shall evolve a comprehensive, planned and documented system for implementation and monitoring of the HSE requirements. This shall be submitted to EIL/Owner for approval. The monitoring for implementation shall be done by regular inspections and compliance to the observations thereof. The Contractor shall get similar HSE requirements implemented at his sub-contractor(s) work site/office. However, compliance of HSE requirements shall be the responsibility of the Contractor. Any review/approval by EIL/Owner shall not absolve contractor of his responsibility/liability in relation to all HSE requirements.

### **3.1.9 Audit**

Contractor shall carry out internal HSE audits. He shall also cooperate during HSE audits by Owner/ EIL. Non-Conformances on HSE (including his sub-contractors) brought out during review/audit by his internal audit team as well as EIL/Owner's representative shall be resolved forthwith by Contractor. Compliance report shall be submitted to EIL/Owner promptly.

To this effect, the contractor shall submit an Audit Plan to EIL/Owner indicating the type of audits (internal by self including his sub-contractors, external by EIL/Owner & Third Party) and their frequencies. The contractor shall conduct an internal HSE audit atleast on quarterly basis and submit a report to EIL/Owner.

### **3.1.10 Meetings**

The Contractor shall ensure participation of his top most executive at site (viz. Resident Engineer/ Site-in-Charge) in Safety Committee/HSE Committee meetings arranged by EIL/Owner usually on monthly basis or as and when called for. The compliance of any observations during the meeting shall be arranged urgently. The contractor shall assist EIL/Owner to achieve the targets set by them on HSE during the project implementation.

In addition, the contractor shall also arrange internal HSE meetings chaired by his top most executive at site on weekly basis and maintain records.

### **3.1.11 Intoxicating drinks & drugs and Smoking**

The contractor shall ensure that his staff members & workers (permanent as well casual) shall not be in a state of intoxication during working hours and shall abide by any law relating to consumption & possession of intoxicating drinks or drugs in force. Awareness about local laws on this issue shall form part of the Induction Training.

The contractor shall ensure that all personnel working for him comply with No-smoking requirements of the owner as notified from time to time. Cigarettes, lighters, auto ignition tools or appliances shall not be allowed inside the plant complex. Smoking shall be permitted only inside smoking booths expressly designated & authorized by the Owner/EIL.

### 3.1.12 Penalty

The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliance or repeated failure in implementation of any of the HSE provisions; EIL/Owner may impose stoppage of work without any cost & time implication to the Owner and/or impose a suitable penalty.

The amount of penalty to be levied shall be upto a cumulative limit of

- 1.0% (one percent) of the contract value for Item Rate or Composite contracts with an overall ceiling of Rs. 10,00,000/- (Rupees ten lakhs).
- 0.2% (Zero decimal two percent) of the contract value for LSTK, EPC, EPCC or Package contracts with an overall ceiling of Rs.1,00,00,000/- (Rupees one crore).

This penalty shall be in addition to all other penalties specified elsewhere in the contract. The decision of imposing stop-work-instruction and imposition of penalty shall rest with EIL/Owner. The same shall be binding on the contractor. Imposition of penalty does not make the contractor eligible to continue the work in unsafe manner.

The amount of penalty applicable on different types of HSE violations is specified below:

| S. No. | Violation of HSE norms                                                                                                                                                                                      | Penalty Amount                 |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1.     | For not using personal protective equipment (Helmet, Shoes, Goggles, Gloves, Full body harness, Face shield, Boiler suit, etc.)                                                                             | Rs.250/- per day/Item/ Person. |
| 2.     | Working without Work Permit/Clearance                                                                                                                                                                       | Rs.5,000/- per occasion        |
| 3.     | Unsafe electrical practices (not installing ELCB, using poor joints of cables, using naked wire without top plug into socket, laying wire/cables on the roads, electrical jobs by incompetent person, etc.) | Rs.3,000/- per item per day.   |
| 4.     | Working at height without full body harness, using non-standard/ rejected scaffolding and not arranging fall protection arrangement as required like Safety Nets.                                           | Rs. 3,000/ per case per day.   |
| 5.     | Unsafe handling of compressed gas cylinders (No trolley, jubilee clips double gauge regulator, improper storage/handling).                                                                                  | Rs.100/- per item per day.     |
| 6.     | Use of domestic LPG for cutting purpose.                                                                                                                                                                    | Rs.1,000 per occasion.         |
| 7.     | No fencing/barricading of excavated areas.                                                                                                                                                                  | Rs.1,000 per occasion.         |

|     |                                                                                                                                                                                                                                                                                            |                                                                 |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 8.  | Not providing shoring/strutting/proper slope and not keeping the excavated earth at least 1.5M away from excavated area.                                                                                                                                                                   | Rs.5,000/- per occasion.                                        |
| 9.  | Non display of caution boards, list of hospitals, emergency services available at work locations.                                                                                                                                                                                          | Rs.500/- per occasion.                                          |
| 10. | Traffic rules violations like over speeding of vehicles, rash driving, wrong parking, not using seat belts, vehicles not fitted with reverse warning alarms.                                                                                                                               | Rs.1,000/- per occasion.                                        |
| 11. | Absence of Contractor's top most executive at site in the safety meetings whenever called by EIL/Owner                                                                                                                                                                                     | Rs. 5,000/- per meeting.                                        |
| 12. | Failure to maintain safety records by Contractor Safety personnel.                                                                                                                                                                                                                         | Rs.1,000/- per month.                                           |
| 13. | Failure to conduct daily safety site inspection, HSE meeting and HSE audit at predefined frequencies                                                                                                                                                                                       | Rs.1,000/- per occasion.                                        |
| 14. | Failure to submit the monthly HSE report by 5 <sup>th</sup> of subsequent month to Engineer-in-Charge.                                                                                                                                                                                     | Rs.5,000/- per occasion and Rs.100/- per day for further delay. |
| 15. | Poor House Keeping                                                                                                                                                                                                                                                                         | Rs.1,000/- per occasion                                         |
| 16. | Failure to report & follow up accident (including Near Miss) reporting system.                                                                                                                                                                                                             | Rs.10,000/- per occasion                                        |
| 17. | Degradation of environment (not confining toxic spills, spilling oil/lubricants onto ground)                                                                                                                                                                                               | Rs.1,000/- per occasion                                         |
| 18. | Not medically examining the workers before allowing them to work at height, not providing ear muffs while allowing them to work in noise polluted areas, made them to work in air polluted areas without respiratory protective devices, etc.                                              | Rs.1,000/- per occasion                                         |
| 19. | Violation of any other safety condition as per job HSE plan, work permit and HSE conditions of contract (using crowbar on cable trenches, improper welding booth, not keeping fire extinguisher ready at hot work site, unsafe rigging practices, non-availability of First-Aid box, etc.) | Rs.1,000/- per occasion                                         |
| 20. | Any violation not covered above                                                                                                                                                                                                                                                            | To be decided by EIL/Owner.                                     |

### **3.1.13 Accident/ Incident investigation**

All accidents/incidents shall be reported immediately on Format No. HSE-2. Thereafter, a supplementary Accident/Incident investigation report on Format No. HSE-3 shall be submitted. Near Miss incident(s) shall also be reported on Format No. HSE-4. The accidents/incidents shall be investigated by a team of Contractor's senior personnel for establishing root cause and recommending corrective & preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to EIL/Owner. Owner/EIL shall have the liberty to independently investigate such occurrences and the Contractor shall extend all necessary help and cooperation in this regard. EIL/Owner shall have the right to share the content of this report with the outside world.

### **3.2 HOUSE KEEPING**

Contractor shall ensure that a high degree of house keeping is maintained and shall ensure interalia; the followings:

- a. All surplus earth and debris are removed/disposed off from the working areas to designated location(s).
- b. Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas are removed to identified location(s).
- c. All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).
- d. Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete, chips and bricks etc shall not be allowed on the roads to obstruct free movement of men & machineries.
- e. Fabricated steel structural, pipes & piping materials shall be stacked properly for erection.
- f. Water logging on roads shall not be allowed.
- g. No parking of trucks/trolleys, cranes and trailers etc shall be allowed on roads, which may obstruct the traffic movement.
- h. Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.
- i. Trucks carrying sand, earth and pulverized materials etc. shall be covered while moving within the plant area/ or these materials shall be transported with top surface wet.
- j. The contractor shall ensure that the atmosphere in plant area and on roads is free from particulate matter like dust, sand, etc. by keeping the top surface wet for ease in breathing.
- k. At least two exits for any unit area shall be assured at all times.

### **3.3 HSE MEASURES**

#### **3.3.1 Construction Hazards**

Contractor shall ensure identification of all Occupational Health, Safety & Environmental hazards in the type of work he is going to undertake and enlist mitigation measures. Contractor shall carry out Job Safety Analysis (JSA) specifically for high risk jobs like working at height & in confined space, deep excavations, radiography jobs, electrical installations, blasting operations, demolishing/ dismantling activities, welding/ gas cutting jobs and submit the findings to EIL/Owner. The necessary HSE measures devised shall be in place prior to start of an activity by the contractor.

A list of typical construction hazards alongwith their effects & preventive measures is given in Appendix-E.

#### **3.3.2 Accessibility**

The Contractor shall provide safe means of access to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen and EIL/Owner.

The access to plant complex shall be strictly regulated. Any person or vehicle entering the complex shall undergo identification check, as per the procedures in force.

#### **3.3.3 Personal Protective Equipments (PPEs)**

The Contractor shall ensure that all their staff, workers and visitors including their sub-contractor(s) have been issued (records to be kept) & wear appropriate PPEs like nape strap type safety helmets preferably with head & sweat band with ¾" cotton chin strap (made of industrial HDPE), safety shoes with steel toe cap and antiskid sole, full body harness (CE marked and conforming to EN361), protective goggles, gloves, ear muffs, respiratory protective devices, etc. All these gadgets shall conform to applicable IS Specifications/CE or other applicable international standards.

Owner may issue a comprehensive color scheme for helmets to be used by various agencies. The Contractor shall follow the scheme issued by the owner. All Safety/ Fire personnel shall preferably wear red colour helmet so that workmen can approach them for guidance during emergencies.

For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory.

For offshore jobs/contracts, contractor shall provide PPEs (new) to EIL & Owner's personnel, at his (contractor's) cost. All personnel shall wear life jacket at all time.

An indicative list of HSE standards/codes is given under Appendix-A.

#### **3.3.4 Working at height**

The contractor shall issue height permit for working at height after verifying and certifying the checkpoints as specified in the attached permit (Format No. HSE-6). He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence to personal protective equipments.

The permit shall be issued initially for one week or expected duration of an activity and extended further for the balance duration. This permit shall be applicable in areas where specific clearance from Owner's operation Deptt./Safety Deptt. is not required. EIL field Engineers/Safety Officers/Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.

In case work is undertaken without taking sufficient precautions as given in the permit, EIL Engineers may cancel the permit and stop the work till satisfactory compliance is arranged. Contractors are expected to maintain a register for issuance of permit and extensions thereof including preserving the used permits for verification during audits etc.

Contractor shall arrange (at his cost) and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing/descending tall structures. These arresters should lock automatically against the anchorage line, restricting free fall of the user. The device is to be provided with a double security opening system to ensure safe attachment or release of the user at any point of rope. In order to avoid shock, the system should be capable of keeping the person in vertical position in case of a fall.

Contractor shall ensure that Full body harnesses conforming EN361 and having authorized CE marking is used by all personnel while working at height. The lanyards and life lines should have enough tensile strength to take the load of the worker in case of a fall. One end of the lanyard shall be firmly tied with the harnesses and the other end with life line. The harness should be capable of keeping the workman vertical in case of a fall, enabling him to rescue himself.

Contractor shall provide Roof Top Walk Ladders for carrying out activities on sloping roofs in order to reduce the chances of slippages and falls.

Contractor shall ensure that a proper Safety Net System is used wherever the hazard of fall from height is present. The safety net, preferably a knotted one with mesh ropes conforming to IS 5175/ ISO 1140 shall have a border rope & tie cord of minimum 12mm dia. The Safety Net shall be located not more than 6.0 meters below the working surface extending on either side upto sufficient margin to arrest fall of persons working at different heights.

Contractor shall ensure positive isolation while working at different levels like in the pipe rack areas. The working platforms with toe boards & hand rails shall have sufficient space to hold the workmen and the tools & the tackles including the equipments required for executing the job.

### **3.3.5 Scaffoldings & Barricading**

Suitable scaffoldings shall be provided to workmen for all works that cannot be safely done from the ground or from solid construction except such short period work that can be safely done using ladders. When a ladder is used, an extra workman shall be engaged for holding the ladder.

The contractor shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Owner/EIL reserves the right to ask the contractor to submit certification and or design calculations from his Engineering regarding load carrying capacity of the scaffoldings.

All scaffolds shall be inspected by a Scaffolding Inspector of the contractor. He shall paste a GREEN tag on each scaffold found safe and a RED tag on each scaffold found unsafe. Scaffoldings with GREEN tag only shall be permitted to be used and RED ones shall immediately be removed from the site.

The contractor shall ensure positive barricading of the excavated, radiography, heavy lift, high pressure hydrostatic & pneumatic testing and other such areas. Sufficient warning signs shall be displayed along the barricading areas.

### **3.3.6 Electrical installations**

All electrical installations/ connections shall be carried out as per the provisions of latest revision of following codes/standards, in addition to the requirements of Statutory Authorities and IE/applicable international rules & regulations:

- OISD STD 173 : Fire prevention & protection system for electrical installations
- SP 30 (BIS) : National Electric Code

All electrical installations shall be approved by the concerned statutory authorities.

#### **3.3.6.1 The contractor shall meet the following requirements:**

- i) Ensure that electrical systems and equipment including tools & tackles used during construction phase are properly selected, installed, used and maintained as per provisions of the latest revision of the Indian Electrical/ applicable international regulations.
- ii) Shall deploy qualified & licensed electricians for proper & safe installation and for regular inspection of construction power distribution system/points including their earthing. A copy of the license shall be submitted to EIL / Owner for records. Availability of at least one competent licensed electrician shall be ensured at site round the clock to attend to the normal/emergency jobs.
- iii) All switchboards / welding machines shall be kept in well-ventilated & covered shed. The shed shall be elevated to avoid water logging. No flammable materials shall be used for constructing the shed. Also flammable materials shall not be stored in and around electrical equipment / switchboard. Adequate clearances and operational space shall be provided around the equipment.
- iv) Fire extinguishers and insulating mats shall be provided in all power distribution centers.
- v) Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.
- vi) Proper house keeping shall be done around the electrical installations.
- vii) All temporary installations shall be tested before energising, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.
- viii) All welders shall use hand gloves irrespective of holder voltage.
- ix) Multilingual (Hindi, English and local language) caution boards, shock treatment charts and instruction plate containing location of isolation point for incoming supply, name & telephone No. of contact person in emergency shall be provided in substations and near all distribution boards / local panels.
- x) Operation of earth leakage device shall be checked regularly by temporarily connecting series test lamp (2 bulbs of equal rating connected in series) between phase and earth.
- xi) Regular inspection of all installations (at least once in a month)

3.3.6.2 The following features shall also be ensured for all electrical installations during construction phase by the contractor:

- i) Each installation shall have a main switch with a protective device, installed in an enclosure adjacent to the metering point. The operating height of the main switch shall not exceed 1.5 M. The main switch shall be connected to the point of supply by means of armoured cable.
- ii) The outgoing feeders shall be double or triple pole switches with fuses / MCBs. Loads in a three phase circuit shall be balanced as far as possible and load on neutral should not exceed 20% of load in the phase.
- iii) The installation shall be adequately protected against overload, short circuit and earth leakage by the use of suitable protective devices. Fuses wherever used shall be HRC type. Use of rewirable fuses shall be strictly prohibited. The earth leakage device shall have an operating current not exceeding 30 mA.
- iv) All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.
- v) All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps.
- vi) Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm<sup>2</sup> copper shall be used for all single phase hand tools.
- vii) Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used.
- viii) All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multistrand wires / cables.
- ix) Cables shall be free from any insulation damage.
- x) Minimum depth of cable trench shall be 750 mm for MV & control cables and 900 mm for HV cables. These cables shall be laid over a sand layer and covered with sand, brick & soil for ensuring mechanical protection. Cables shall not be laid in waterlogged area as far as practicable. Cable route markers shall be provided at every 25 M of buried trench route. When laid above ground, cables shall be properly cleated or supported on rigid poles of atleast 2 M high. Minimum head clearance of 6 meters shall be provided at road crossings.
- xi) Under ground road crossings for cables shall be avoided to the extent feasible. In any case no under ground power cable shall be allowed to cross the roads without pipe sleeve.
- xii) All cable joints shall be done with proper jointing kit. No taped/ temporary joints shall be used.
- xiii) An independent earthing facility should preferably be established within the temporary installation premises. All appliances and equipment shall be adequately earthed. In case of armoured cables, the armour shall be bonded to the earthing system.
- xiv) All cables and wire rope used for earth connections shall be terminated through tinned copper lugs.

- xv) In case of local earthing, earth electrodes shall be buried near the supply point and earth continuity wire shall be connected to local earth plate for further distribution to various appliances. All insulated wires for earth connection shall have insulation of green colour.
- xvi) Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case.
- xvii) ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

### **3.3.7 Welding/ Gas cutting**

Contractor shall ensure that flash back arrestors conforming to BS:6158 or equivalent are installed on all gas cylinders as well as at the torch end of the gas hose, while in use. All cylinders shall be mounted on trolleys and provided with a closing key. The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrester/Non Return Valve device. The hoses for acetylene and oxygen cylinders must be of different colours. Their connections to cylinders and burners shall be made with a safety collar. At end of work, the cylinders in use shall be closed and hoses depressurized. All welding machines shall have effective earthing. In order to help maintain good housekeeping, and to reduce fire hazard, live electrode bits shall be contained safely and shall not be thrown directly on the ground.

### **3.3.8 Ergonomics and tools & tackles**

The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health. All lifting tools, tackles, equipment, accessories including cranes shall be tested periodically by statutory/competent authority for their condition and load carrying capacity. Valid test & fitness certificates from the applicable authority shall be submitted to Owner/EIL for their review/acceptance before the lifting tools, tackles, equipment, accessories and cranes are used. The contractor shall not be allowed to use defective equipment or tools not adhering to safety norms.

Contractor shall ensure installation of Safe Load Indicator (SLI) on all cranes (while in use) to minimize overloading risk. SLI shall have capability to continuously monitor and display the load on the hook, and automatically compare it with the rated crane capacity at the operating condition of the crane. The system shall also provide visual and audible warnings at set capacity levels to alert the operator in case of violations.

The contractor shall be responsible for safe operations of different equipments mobilized and used by him at the workplace like transport vehicles, engines, cranes, mobile ladders, scaffoldings, work tools, etc.

### **3.3.9 Occupational Health**

The contractor shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures.

For surface cleaning operations, sand blasting shall not be permitted even if not explicitly stated elsewhere in the contract.

To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium.

Appropriate respiratory protective devices shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes, etc.

Workmen shall be made aware of correct methods for lifting, carrying, pushing & pulling of heavy loads. Wherever possible, manual handling shall be replaced by mechanical lifting equipments.

For jobs like drilling/demolishing/dismantling where noise pollution exceeds the specified limit of 85 decibels, ear muffs shall be provided to the workers.

To avoid upper limb disorders and backaches, Display Screen Equipments' workplace stations shall be carefully designed & used with proper sitting postures. Power driven hand-held tools shall be maintained in good working condition to minimize their vibrating effects and personnel using these tools shall be taught how to operate them safely & how to maintain good circulation in hands.

The contractor shall arrange health check up for all the workers at the time of induction. Health check may have to be repeated if the nature of duty assigned to him is changed necessitating health check or doubt arises about his wellness. EIL/Owner reserve the right to ask the contractor to submit test reports. Regular health check-ups are mandatory for the workers assigned with Welding, Radiography, Blasting, Heavy Lift and Height (>2m) jobs. All the health check-ups shall be conducted by registered Medical practitioner and records are to be maintained.

The contractor shall ensure vaccination of all the workers including their families.

### **3.3.10 Hazardous substances**

Hazardous, inflammable and/or toxic materials such as solvent coating, thinners, anti-termite solutions, water proofing materials shall be stored in appropriate containers preferably with lids having spillage catchment trays and shall be stored in a good ventilated area. These containers shall be labeled with the name of the materials highlighting the hazards associated with its use and necessary precautions to be taken.

Where contact or exposure of hazardous materials exceeds the specified limit or otherwise have harmful affects, appropriate personal protective equipments such as gloves, goggles, aprons, chemical resistant clothing, respirator, etc. shall be used.

The work place shall be checked prior to start of activities to identify the location, type and condition of any asbestos materials which could be disturbed during the work. In case asbestos material is detected, usage of appropriate PPEs by all personnel shall be ensured and the matter shall be reported immediately to EIL/ Owner.

### **3.3.11 Slips, trips & falls**

The contractor shall establish a regular cleaning and basic housekeeping programme that covers all aspects of the workplace to help minimize the risk of slips, trips & falls. The contractor shall take positive measures like keeping the work area tidy, storing waste in suitable containers & harmful items separately, keeping passages, stairways, entrances & exits especially emergency ones clear, cleaning up spillages immediately and replacing damaged carpet/ floor tiles, mats & rugs at once to avoid slips, trips & falls.

### **3.3.12 Radiation exposure**

- a) All personnel exposed to physical agents such as non-ionizing radiation, ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.

- b) For ionizing radiation, requirements of Bhabha Atomic Research Centre (BARC)/ Atomic Energy Regulatory Board (AERB) shall be followed.

### **3.3.13 Explosives/Blasting operations**

Blasting operations shall be carried out as per latest Explosive Rules (Indian/ International) with prior permission. The contractor shall obtain license from Controller of explosives for collection, transportation, storage of explosives as well as for carrying out blasting operations.

### **3.3.14 Demolition/ Dismantling**

The contractor shall adhere to safe demolishing/ dismantling practices at all stages of work to guard against unsafe working practices. The contractor shall disconnect service lines (power, gas supply, water, etc.)/ make alternate arrangements prior to start of work and restore them, if required as directed by EIL/ Owner at no extra cost. Before carrying out any demolition/ dismantling work, the contractor shall take prior approval of EIL/Owner in Format No.HSE-9. For revamp jobs in operating plants where location of underground utilities is not known with certainty, the contractor shall depute an experienced person for supervision and shall make adequate arrangements for Fire fighting & First-Aid during the execution of these activities.

### **3.3.15 Road Safety**

The contractor shall ensure adequately planned road transport safety management system. The vehicles shall be fitted with reverse warning alarms & flashing lights and usage of seat belts shall be ensured. The contractor shall also ensure a separate pedestrian route for safety of the workers and comply with all traffic rules & regulations. The maximum allowable speed shall be adhered to. In case of an alert or emergency, the vehicles must clear all the routes, roads, access.

Dumpers, Tippers, etc. shall not be allowed to carry workers within the plant area and also to & from the labour colony. Hydras shall only be allowed for handling the materials at fabrication/ storage yards and in no case shall be allowed to transport the materials.

For pipeline jobs, the contractor shall submit a comprehensive plan covering transportation of pipes, movement of side booms, movement of vehicles on the ROW, etc.

### **3.3.16 Welfare measures**

Contractor shall, at the minimum, ensure the following facilities at work sites.

- A crèche at site where 10 or more female workers are having children below the age of 6 years.
- Reasonable canteen facilities at site and in labour camps at appropriate location depending upon site conditions.
- Adequately lighted & ventilated Rest rooms at site (separate for male workers and female workers)
- Toilets, drinking water, adequate lighting at site and labour camps, commensurate with applicable Laws/ Legislation

### **3.3.17 Environment Protection**

Contractor shall ensure proper storage and utilization methodology of materials that are detrimental to the environment. Where required, Contractor shall ensure that only the environment friendly materials are selected and emphasize on recycling of waste materials

such as metals, plastics, glass, paper, oil & solvents. The waste that can not be minimized, reused or recovered shall be stored and disposed of safely. In no way, toxic spills shall be allowed to percolate into the ground. The contractor shall not use the empty areas for dumping the wastes.

The contractor shall strive to conserve energy and water wherever feasible.

The contractor shall ensure dust free environment at workplace by sprinkling water on the ground at frequent intervals. The air quality parameters for dust, poisonous gases, toxic releases, harmful radiations, etc. shall be checked by the contractor on daily basis and whenever need arises.

The contractor shall not be allowed to discharge chemicals, oil, silt, sewage, sullage and other waste materials directly into the controlled waters like surface drains, streams, rivers, ponds. A discharge plan suggesting the methods of treating the waste before discharging shall be submitted to EIL/Owner for approval.

For pipeline jobs, top soil shall be stacked separately while making ROW through fields. This fertile soil shall be placed back on top after backfilling.

For offshore construction barges, arrangements shall be made for safe disposal of human, food & other wastes and applicable laws in this regard shall be followed.

### 3.3.18 Rules & Regulations

All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials, substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of EIL/Owner. An indicative list of Statutory Acts & Rules relating to HSE is given under Appendix-D.

### 3.3.19 Weather Protection

Contractor shall take appropriate measures to protect workers from severe storms, solar radiations, poisonous gases, dust, etc. by ensuring proper usage of PPEs like Sun glasses, Sun screen lotions, respirators, dust masks, etc. and rearranging/ planning the construction activities to suit the weather conditions.

### 3.3.20 Communication

All persons deployed at the work site shall have access to effective means of communication so that any untoward incident can be reported immediately and assistance sought by them.

All health & safety information shall be communicated in a simple & clear language easily understood by the local workforce.

### 3.3.21 Confined Space Entry

The contractor shall obtain a work permit (Format No. HSE -7) before entering a confined space. All necessary precautions mentioned therein shall be adhered to. An attendant shall be positioned outside a confined space for extending help during an emergency. All appropriate PPEs and air quality parameters shall be checked before entering a confined space. It shall be ensured that the piping of the equipment which has to be opened, is pressure- free by checking that blinds are in place, vents are open and volume is drained.

### 3.3.22 Heavy Lifts

The contractor shall submit detailed rigging studies plan for EIL/ Owner approval prior to lifting equipment which cannot be erected with a crane of approx. 100 MT capacity due to constraints of its dimensions, location of foundation height, approach & weight.

Prior to actual lifting activities, contractor shall check the validity of the crane inspection certificate issued by statutory/ competent authority. This requirement shall also apply to all rigging equipments utilized for the job.

The contractor shall, at all times, be responsible for all rigging activities.

Adequate safety measures such as positive barricading, usage of appropriate PPEs, permit to work, etc. shall be taken during all heavy or critical lifts.

### 3.3.23 Key Performance Indicators

The contractor shall measure an activity in both leading & trailing indicators for statistical and performance measurement. The activities pertaining to key performance indicators are covered in Monthly HSE Report (Format No. HSE-5). The contractor shall try to achieve a statistically fair record and strive for its continual improvement.

### 3.3.24 Unsuitable Land Conditions

Contractor shall take appropriate measures and necessary work permits/clearances if work is to be done in or around marshy areas, river crossings, mountains, monuments, etc.

### 3.3.25 Under Water Inspection

Contractor shall ensure that boats and other means used for transportation, surveying & investigation works shall be certified seaworthy by a recognized classification society. It shall be equipped with all life saving devices like life jackets, adequate fire protection arrangements

and shall possess communication facilities like cellular phones, wireless, walkie-talkie. All divers used for seabed surveys, underwater inspections shall have required authorized license, suitable life saving kit. Number of hours of work by divers shall be limited as per regulations. EIL/ Owner shall have the right to inspect the boat and scrutinize documents in this regard.

## 3.4 TOOL BOX MEETING (TBM)

Contractor shall conduct daily TBM with workers prior to start of work and shall maintain proper record of the meeting. A suggested format is given below. The TBM is to be conducted by the immediate supervisor of the workers.

| TOOLBOX MEETING RECORDING SHEET |           |         |
|---------------------------------|-----------|---------|
| Date & Time                     |           |         |
| Subject                         |           |         |
| Presenter                       |           |         |
| Hazards involved                |           |         |
| Precautions to be taken         |           |         |
| Worker's Name                   | Signature | Section |
| Remarks, in any                 |           |         |

The topics during TBM shall include

- Hazards related to work assigned on that day and precautions to be taken.
- Any forthcoming HSE hazards/events/instruction/orders, etc.

The above record can be kept in local language, which workers can read. These records shall be made available to EIL/ Owner whenever demanded.

### 3.5 TRAINING & INDUCTION PROGRAMME

Contractor shall conduct an induction programme on HSE for his workers and maintain records. The Gate Pass shall be issued only to those workers who successfully qualify the induction programme.

Contractor shall ensure that all his personnel possess appropriate training to carry out the assigned job safely. The training should be imparted in a language understood by them and should specifically be trained about

- Potential hazards to which they may be exposed at their workplace
- Measures available for prevention and elimination of these hazards

The topics during training shall cover, at the minimum ;

- Education about hazards and precautions required
- Emergency and evacuation plan
- HSE requirements
- Fire fighting and First-Aid
- Use of PPEs
- Local laws on intoxicating drinks, drugs, smoking in force

Records of the training shall be kept and submitted to EIL/ Owner whenever demanded.

For offshore and jetty jobs, contractor shall ensure that all personnel deployed have undergone a structured sea survival training including use of lifeboats, basket landing, use of radio communication etc. from an agency acceptable to Owner/EIL.

### 3.6 INSPECTION

The contractor shall carryout daily HSE inspection and record observations at a central location. These inspection records shall be freely accessible to Owner/ EIL representatives. The contractor shall also assist Owner/EIL representatives during the HSE inspections conducted by them.

### 3.7 ADDITIONAL SAFETY REQUIREMENTS FOR WORKING INSIDE A RUNNING PLANT

As a minimum, the contractor shall ensure adherence to following safety requirements while working in or in the close vicinity of an operating plant:

- a) Contractor shall obtain permits for Hot work, Cold work, Excavation and Confined Space from Owner in the prescribed format.
- b) The contractor shall monitor, record and compile list of his workers entering the operational plant/unit each day and ensure & record their return after completing the job.

- c) Contractor's workers and staff members shall use designated entrances and proceed by designated routes to work areas only assigned to them. The workers shall not be allowed to enter units' area, tanks area, pump rooms, etc. without work authorization permit.
- d) Work activities shall be planned in such a way so as to minimize the disruption of other activities being carried out in an operational plant/unit and activities of other contractors.
- e) The contractor shall submit a list of all chemicals/toxic substances that are intended to be used at site and shall take prior approval of the Owner.
- f) Specific training on working in a hydrocarbon plant shall be imparted to the work force and mock drills shall be carried out for Rescue operations/First-Aid measures.
- g) Proper barricading/cordoning of the operational units/plants shall be done before starting the construction activities. No unauthorized person shall be allowed to trespass. The height and overall design of the barricading structure shall be finalized in consultation with the Owner and shall be got approved from the Owner.
- h) Care shall be taken to prevent hitting underground facilities such as electrical cables, hydrocarbon piping during execution of work.
- i) Barricading with water curtain shall be arranged in specific/critical areas where hydrocarbon vapors are likely to be present such as near horton spheres or tanks. Positioning of fire tenders (from owner) shall also be ensured during execution of critical activities.
- j) Emergency evacuation plan shall be worked out and all workmen shall be apprised about evacuation routes. Mock drill operations may also be conducted.
- k) Flammable gas test shall be conducted prior to any hot work using appropriate measuring instruments. Sewers, drains, vents or any other gas escaping points shall be covered with flame retardant tarpaulin.
- l) Respiratory devices shall be kept handy while working in confined zones where there is a danger of inhalation of poisonous gases. Constant monitoring of presence of Gas/Hydrocarbon shall be done.
- m) Clearance shall be obtained from all parties before starting hot tapping, patchwork on live lines and work on corroded tank roof.
- n) Positive isolation of line/equipment by blinding for welding/cutting/grinding shall be done. Closing of valve will not be considered sufficient for isolation.
- o) Welding spatters shall be contained properly and in no case shall be allowed to fall on the ground containing oil. Similar care shall be taken during cutting operations.
- p) The vehicles, cranes, engines, etc. shall be fitted with spark arresters on the exhaust pipe and got it approved from Safety Department of the Owner.
- q) Plant air should not be used to clean any part of the body or clothing or use to blow off dirt on the floor.
- r) Gas detectors should be installed in gas leakage prone areas as per requirement of Owner's plant operation personnel.

- s) An experienced full time safety personnel shall be exclusively deployed to monitor safety aspects in running plants.

### **3.8 SELF ASSESSMENT AND ENHANCEMENT**

The contractor shall develop a method of check & balance through self assessment & enhancement techniques and shall explore the opportunities for continual improvement in the HSE system.

### **3.9 HSE PROMOTION**

The contractor shall encourage his workforce to promote HSE efforts at workplace by way of organizing workshops/seminars/training programmes, celebrating HSE awareness weeks & National Safety Day, conducting quizzes & essay competitions, distributing pamphlets, posters & material on HSE, providing incentives for maintaining good HSE practices and granting bonus for completing the job without any lost time accident.

## **4.0 DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR**

### **4.1 ON AWARD OF CONTRACT**

The Contractor shall submit a comprehensive Health, Safety and Environment Manual or programme for approval by EIL/Owner prior to start of work. The Contractor shall participate in the pre-start meeting with EIL/Owner to finalize HSE Plans including the following:

- Job procedure to be followed by the Contractor for construction activities including handling of equipments, scaffolding, electric installations, etc. describing the risks involved, actions to be taken and methodology for monitoring each activity.
- EIL/Owner review/audit requirement.
- Organization structure along with responsibility and authority, records/ reports etc. on HSE activities.
- Emergency evacuation plan/ procedures for site and labour camps
- Job Safety Analysis for high risk jobs
- Procedures for reporting & investigation of accidents and near misses.
- HSE Training programmes
- Reference to Rules, Regulations and statutory requirements.
- HSE reporting

### **4.2 DURING JOB EXECUTION**

Contractor shall implement approved Health, Safety and Environment management programme including but not limited to as brought out under para 3.0. Contractor shall also ensure:

- to arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc, as applicable.
- to arrange all HSE permits before start of activities (as applicable), like permits for hot work, working at heights (Refer Format No. HSE-6), confined space (Refer Format No. HSE-7), Radiation Work Permit (Refer Format No. HSE-8), Demolishing/ Dismantling Work Permit (Refer Format No. HSE-9), storage of chemical/ explosive materials & its use and implement all precautions mentioned therein. In this regard, requirements of Oil industry Safety Directorate Standard No. Std -105 "Work Permit Systems" shall be complied with while working in existing Oil or Gas processing plants.

- to submit, timely, the completed checklist on HSE activities in Format No.HSE-1, Monthly HSE report in Format No.HSE-5 (use of web based package is compulsory wherever the facility is available else a hard copy is to be submitted), accident/incident reports, investigation reports etc. as per EIL/Owner requirements. Compliance of instructions on HSE shall be done by Contractor and informed urgently to EIL/Owner.
- that his top most executive at site attends all the Safety Committee/HSE meetings arranged by EIL/Owner. Only in case of his absence from site that a second senior most person shall be nominated by him, in advance, and communicated to EIL/Owner.
- display at site office and at prominent locations HSE Policy, caution boards, list of hospitals, emergency services available, safety signs like Men at work, Speed Limits, Hazardous Area.
- provide posters, banners for safe working to promote safety consciousness.
- assess, analyze & mitigate the construction hazards
- carryout audits/inspection at his works as well as sub contractor works as per approved HSE plan/procedure/programme & submit the reports for EIL/Owner review.
- assistance & cooperate during HSE audits by EIL/Owner, and submit compliance report.
- generate & submit of HSE records/report as per this specification.
- apprise EIL/Owner on HSE activities at site.
- carryout all dismantling activities safely, with prior approval of EIL/Owner representative.

#### 4.3 DURING SHORT LISTING OF THE SUB-CONTRACTORS

The contractor shall review the HSE management system of the sub-contractors in line with the requirements given in this specification. The contractor shall be held responsible for the shortcomings observed in the HSE management system of the sub-contractor(s) during execution of the job.

#### 5.0 RECORDS

At the minimum, the contractor shall maintain/ submit HSE records in the following reporting formats:

|    |                                                       |       |
|----|-------------------------------------------------------|-------|
| 1. | Monthly HSE Checklist cum compliance report           | HSE-1 |
| 2. | Accident/ Incident Report                             | HSE-2 |
| 3. | Supplementary Accident/ Incident Investigation report | HSE-3 |
| 4. | Near Miss Incident Report                             | HSE-4 |
| 5. | Monthly HSE Report                                    | HSE-5 |
| 6. | Permit for working at height                          | HSE-6 |
| 7. | Permit for working in confined space                  | HSE-7 |
| 8. | Permit for radiation work                             | HSE-8 |
| 9. | Permit for demolishing/ dismantling                   | HSE-9 |

**APPENDIX-A  
(Sheet 1 of 2)**

**A. I.S. CODES ON HSE**

|                     |                                                                                                                            |
|---------------------|----------------------------------------------------------------------------------------------------------------------------|
| SP: 53              | Safety code for the use, Care and protection of hand operated tools.                                                       |
| IS: 818             | Code of practice for safety & health requirements in electric and gas welding and cutting operations                       |
| IS: 1179            | Eye & Face precautions during welding, equipment etc.                                                                      |
| IS: 1860            | Safety requirements for use, care and protection of abrasive grinding wheels.                                              |
| IS: 1989 (Part -II) | Leather safety boots and shoes                                                                                             |
| IS: 2925            | Industrial Safety Helmets                                                                                                  |
| IS: 3016            | Code of practice for fire safety precautions in welding & cutting operation.                                               |
| IS: 3043            | Code of practice for earthing                                                                                              |
| IS: 3764            | Code of safety for excavation work                                                                                         |
| IS: 3786            | Methods for computation of frequency and severity rates for industrial injuries and classification of industrial accidents |
| IS: 3996            | Safety Code of scaffolds and ladders                                                                                       |
| IS: 4082            | Recommendations on stacking and storage of construction materials and components at site                                   |
| IS: 4770            | Rubber gloves for electrical purposes                                                                                      |
| IS: 5121            | Safety code for piling and other deep foundations                                                                          |
| IS: 5216 (Part-I)   | Recommendations on Safety procedures and practices in electrical works                                                     |
| IS: 5557            | Industrial and Safety rubber lined boots                                                                                   |
| IS: 5983            | Eye protectors                                                                                                             |
| IS: 6519            | Selection, care and repair of Safety footwear                                                                              |
| IS: 6994 (Part-I)   | Industrial Safety Gloves (Leather & Cotton Gloves)                                                                         |
| IS: 7293            | Safety Code for working with construction Machinery                                                                        |
| IS: 8519            | Guide for selection of industrial safety equipment for body protection                                                     |
| IS: 9167            | Ear protectors                                                                                                             |
| IS: 11006           | Flash back arrestor (Flame arrestor)                                                                                       |
| IS: 11016           | General and safety requirements for machine tools and their operation                                                      |
| IS: 11057           | Specification for Industrial safety nets                                                                                   |
| IS: 11226           | Leather safety footwear having direct moulded rubber sole                                                                  |
| IS: 11972           | Code of practice for safety precaution to be taken when entering a sewerage system                                         |
| IS: 13367           | Code of practice-safe use of cranes                                                                                        |
| IS: 13416           | Recommendations for preventive measures against hazards at working place                                                   |

**APPENDIX-A**  
**(Sheet 2 of 2)**

**B. INTERNATIONAL STANDARDS ON HSE**

|                                                |   |                                                                                               |
|------------------------------------------------|---|-----------------------------------------------------------------------------------------------|
| Safety Glasses                                 | : | ANSI Z 87.1, ANSI ZZ 87.1, AS 1337, BS 2092, BS 1542, BS 679, DIN 4646/ 58211                 |
| Safety Shoes                                   | : | ANSI Z 41.1, AS 2210, EN 345                                                                  |
| Hand Gloves                                    | : | BS 1651                                                                                       |
| Ear Muffs                                      | : | BS 6344, ANSI S 31.9                                                                          |
| Hard Hat                                       | : | ANSI Z 89.1/89.2, AS 1808 , BS 5240, DIN 4840                                                 |
| Goggles                                        | : | ANSI Z 87.1                                                                                   |
| Face Shield                                    | : | ANSI Z 89.1                                                                                   |
| Breathing Apparatus                            | : | BS 4667, NIOSH                                                                                |
| Welding & Cutting                              | : | ANSI Z 49.1                                                                                   |
| Safe handling of compressed Gases in cylinders | : | P-1 (Compressed Gas Association<br>1235 Jefferson Davis Highway,<br>Arlington VA 22202 - USA) |

APPENDIX-B

DETAILS OF FIRST AID BOX

| SL. NO. | DESCRIPTION                                                       | QUANTITY           |
|---------|-------------------------------------------------------------------|--------------------|
| 1.      | Small size Roller Bandages, 1 Inch Wide (Finger Dressing small)   | 6 Pcs.             |
| 2.      | Medium size Roller Bandages, 2 Inches Wide (Hand & Foot Dressing) | 6 Pcs.             |
| 3.      | Large size Roller Bandages, 4 Inches Wide (Body Dressing Large)   | 6 Pcs.             |
| 4.      | Large size Burn Dressing (Burn Dressing Large)                    | 4 Pkts.            |
| 5.      | Cotton Wool (20 gms packing)                                      | 4 Pkts.            |
| 6.      | Antiseptic Solution Dettol (100 ml.) or Savalon                   | 1 Bottle           |
| 7.      | Mercurichrome Solution (100 ml.) 2% in water                      | 1 Bottle           |
| 8.      | Ammonia Solution (20 ml.)                                         | 1 Bottle           |
| 9.      | A Pair of Scissors                                                | 1 Piece            |
| 10.     | Adhesive Plaster (1.25 cm X 5 m)                                  | 1 Spool            |
| 11.     | Eye pads in Separate Sealed Pkt.                                  | 4 pcs.             |
| 12.     | Tourniquet                                                        | 1 No.              |
| 13.     | Safety Pins                                                       | 1 Dozen            |
| 14.     | Tinc. Iodine/ Betadin (100 ml.)                                   | 1 Bottle           |
| 15.     | Polythene Wash cup for washing eyes                               | 1 No.              |
| 16.     | Potassium Permanganate (20 gms.)                                  | 1 Pkt.             |
| 17.     | Tinc. Benzoine (100 ml.)                                          | 1 Bottle           |
| 18.     | Triangular Bandages                                               | 2 Nos.             |
| 19.     | Band Aid Dressing                                                 | 5 Pcs.             |
| 20.     | Iodex/Moov (25 gms.)                                              | 1 Bottle           |
| 21.     | Tongue Depressor                                                  | 1 No.              |
| 22.     | Boric Acid Powder (20 gms.)                                       | 2 Pkt.             |
| 23.     | Sodium Bicarbonate (20 gms.)                                      | 1 Pkt.             |
| 24.     | Dressing Powder (Nebasulf) (10 gms.)                              | 1 Bottle           |
| 25.     | Medicinal Glass                                                   | 1 No.              |
| 26.     | Duster                                                            | 1 No.              |
| 27.     | Booklet (English & Local Language)                                | 1 No. each         |
| 28.     | Soap                                                              | 1 No.              |
| 29.     | Toothache Solution                                                | 1 No.              |
| 30.     | Vicks (22 gms.)                                                   | 1 Bottle           |
| 31.     | Forceps                                                           | 1 No.              |
| 32.     | Note Book                                                         | 1 No.              |
| 33.     | Splints                                                           | 4 Nos.             |
| 34.     | Lock                                                              | 1 Piece            |
| 35.     | Life Saving/Emergency/Over-the counter Drugs                      | As decided at site |

Box size : 14" x 12" x 4"

Note : The medicines prescribed above are only indicative. Equivalent medicines can also be used.  
A prescription, in this regard, shall be required from a qualified Physician.

**APPENDIX-C**

**TYPE OF FIRES VIS-À-VIS FIRE EXTINGUISHERS**

| <div>Fire<br/>↓</div> <div>Fire →<br/>Extinguisher</div>               | Water | Foam | CO <sub>2</sub>                 | Dry Powder                      | Multi purpose (ABC) |
|------------------------------------------------------------------------|-------|------|---------------------------------|---------------------------------|---------------------|
| Originated from paper, clothes, wood                                   | ✓     | ✓    | can control minor surface fires | can control minor surface fires | ✓                   |
| Inflammable liquids like alcohol, diesel, petrol, edible oils, bitumen | ×     | ✓    | ✓                               | ✓                               | ✓                   |
| Originated from gases like LPG, CNG, H <sub>2</sub>                    | ×     | ×    | ✓                               | ✓                               | ✓                   |
| Electrical fires                                                       | ×     | ×    | ✓                               | ✓                               | ✓                   |

**LEGEND :**     ✓ : CAN BE USED

                  × : NOT TO BE USED

**Note :** Fire extinguishing equipment must be checked atleast once a year and after every use by an authorized person. The equipment must have an inspection label on which the next inspection date is given. Type of extinguisher shall clearly be marked on it.

## **APPENDIX-D**

### **Indicative List of Statutory Acts & Rules Relating to HSE**

- The Indian Explosives Act and Rules
- The Motor Vehicle Act and Central Motor Vehicle Rules
- The Factories Act and concerned Factory Rules
- The Petroleum Act and Petroleum Rules
- The Workmen Compensation Act
- The Gas Cylinder Rules and the Static & Mobile Pressure Vessels Rules
- The Indian Electricity Act and Rules
- The Indian Boiler Act and Regulations
- The Water (Prevention & Control & Pollution) Act
- The Water (Prevention & Control of Pollution) Cess Act
- The Mines & Minerals (Regulation & Development) Act
- The Air (Prevention & Control of Pollution) Act
- The Atomic Energy Act
- The Radiation Protection Rules
- The Indian Fisheries Act
- The Indian Forest Act
- The Wild Life (Protection) Act
- The Environment (Protection) Act and Rules
- The Hazardous Wastes (Management & Handling) Rules
- The Manufacturing, Storage & import of Hazardous Chemicals Rules
- The Public Liability Act
- The Building and Other Construction Workers (Regulation of Employment and Condition of service) Act
- Other statutory acts Like EPF, ESIS, Minimum Wage Act.

APPENDIX-E  
(Sheet 1 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES

| ACTIVITY                                            | TYPE OF HAZARD                                                              | EFFECT OF HAZARD                                               | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A)<br>EXCAVATION<br><br>● Pit Excavation upto 3.0m | ➤ Falling into pit                                                          | ➤ Personal injury                                              | ➤ Provide guard rails/ barricade with warning signal<br>➤ Provide atleast two entries/ exits.<br>➤ Provide escape ladders.                                                                                                                                                                                                                                                                                                                                                                    |
|                                                     | ➤ Earth Collapse                                                            | ➤ Suffocation/ Breathlessness<br>➤ Buried                      | ➤ Provide suitable size of shoring and strutting, if required.<br>➤ Keep soil heaps away from the edge equivalent to 1.5m or depth of pit whichever is more.<br>➤ Don't allow vehicles to operate too close to excavated areas. Maintain atleast 2m distance from edge of cut.<br>➤ 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.<br>➤ Battering/benching the sides. |
|                                                     | ➤ Contact with buried electric cables<br>➤ Gas/ Oil Pipelines               | ➤ Electrocutation<br>➤ Explosion                               | ➤ Obtain permission from competent authorities, prior to excavation, if required.<br>➤ Locate the position of buried utilities by referring to plant drawings.<br>➤ 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<br>➤ Flooding due to excessive rain/ underground water | ➤ Can cause drowning situation                                 | ➤ Prevent ingress of water<br>➤ Provide ring buoys<br>➤ Identify and provide suitable size dewatering pump or well point system                                                                                                                                                                                                                                                                                                                                                               |
|                                                     | ➤ Digging in the vicinity of existing Building/ Structure                   | ➤ Building/Structure may collapse<br>➤ Loss of health & wealth | ➤ Obtain prior approval of excavation method from local authorities.<br>➤ Use under-pining method<br>➤ Construct retaining wall side by side.                                                                                                                                                                                                                                                                                                                                                 |
|                                                     | ➤ Movement of vehicles/ equipments close to the edge of cut.                | ➤ May cause cave-in or slides.<br>➤ Persons may get buried.    | ➤ Barricade the excavated area with proper lighting arrangements<br>➤ Maintain at least 2m distance from edge of cut and use stop blocks to prevent over-run<br>➤ Strengthen shoring and strutting                                                                                                                                                                                                                                                                                            |

**APPENDIX-E : (Sheet 2 of 12)**

**CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)**

| ACTIVITY                                                                                      | TYPE OF HAZARD                                                                                               | EFFECT OF HAZARD                                                                                    | PREVENTIVE MEASURES                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Narrow deep excavations for pipelines, etc.</li> </ul> | <ul style="list-style-type: none"> <li>➤ Same as above plus</li> <li>➤ Frequent cave-in or slides</li> </ul> | <ul style="list-style-type: none"> <li>➤ May cause severe injuries or prove fatal</li> </ul>        | <ul style="list-style-type: none"> <li>➤ Battering/benching of sides</li> <li>➤ Provide escape ladders</li> </ul>                                                                                                            |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Flooding due to Hydro-static testing</li> </ul>                     | <ul style="list-style-type: none"> <li>➤ May arise drowning situation</li> </ul>                    | <ul style="list-style-type: none"> <li>➤ Same as above plus</li> <li>➤ Bail out accumulated water</li> <li>➤ Maintain adequate ventilation.</li> </ul>                                                                       |
| <ul style="list-style-type: none"> <li>Rock excavation by blasting</li> </ul>                 | <ul style="list-style-type: none"> <li>➤ Improper handling of explosives</li> </ul>                          | <ul style="list-style-type: none"> <li>➤ May prove fatal</li> </ul>                                 | <ul style="list-style-type: none"> <li>➤ Ensure proper storage, handling &amp; carrying of explosives by trained personnel.</li> <li>➤ Comply with the applicable explosive acts &amp; rules.</li> </ul>                     |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Uncontrolled explosion</li> </ul>                                   | <ul style="list-style-type: none"> <li>➤ May cause severe injuries or prove fatal</li> </ul>        | <ul style="list-style-type: none"> <li>➤ Allow only authorized persons to perform blasting operations.</li> <li>➤ Smoking and open flames are to be strictly prohibited</li> </ul>                                           |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Scattering of stone pieces in atmosphere</li> </ul>                 | <ul style="list-style-type: none"> <li>➤ Can hurt people</li> </ul>                                 | <ul style="list-style-type: none"> <li>➤ Use PPE like goggles, face mask, helmets etc.</li> </ul>                                                                                                                            |
| <ul style="list-style-type: none"> <li>Rock excavation by blasting (Contd)</li> </ul>         | <ul style="list-style-type: none"> <li>➤ Entrapping of persons/ animals.</li> </ul>                          | <ul style="list-style-type: none"> <li>➤ May cause severe injuries or prove fatal</li> </ul>        | <ul style="list-style-type: none"> <li>➤ Barricade the area with red flags and blow siren before blasting.</li> </ul>                                                                                                        |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Misfire</li> </ul>                                                  | <ul style="list-style-type: none"> <li>➤ May explode suddenly</li> </ul>                            | <ul style="list-style-type: none"> <li>➤ Do not return to site for atleast 20 minutes or unless announced safe by designated person.</li> </ul>                                                                              |
| <ul style="list-style-type: none"> <li>Piling Work</li> </ul>                                 | <ul style="list-style-type: none"> <li>➤ Failure of pile-driving equipment</li> </ul>                        | <ul style="list-style-type: none"> <li>➤ Can hurt people</li> </ul>                                 | <ul style="list-style-type: none"> <li>➤ Inspect Piling rigs and pulley blocks before the beginning of each shift.</li> </ul>                                                                                                |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Noise pollution</li> </ul>                                          | <ul style="list-style-type: none"> <li>➤ Can cause deafness and psychological imbalance.</li> </ul> | <ul style="list-style-type: none"> <li>➤ Use personal protective equipments like ear plugs, muffs, etc.</li> </ul>                                                                                                           |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Extruding rods/casing</li> </ul>                                    | <ul style="list-style-type: none"> <li>➤ Can hurt people</li> </ul>                                 | <ul style="list-style-type: none"> <li>➤ Barricade the area and install sign boards</li> <li>➤ Provide first-aid</li> </ul>                                                                                                  |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Working in the vicinity of 'Live-Electricity'</li> </ul>            | <ul style="list-style-type: none"> <li>➤ Can cause electrocution/ Asphyxiation</li> </ul>           | <ul style="list-style-type: none"> <li>➤ Keep sufficient distance from Live-Electricity as per IS code.</li> <li>➤ Shut off the supply, if possible</li> <li>➤ Provide artificial/rescue breathing to the injured</li> </ul> |
| (B) CONCRETING                                                                                | <ul style="list-style-type: none"> <li>➤ Air pollution by cement</li> </ul>                                  | <ul style="list-style-type: none"> <li>➤ May affect Respiratory System</li> </ul>                   | <ul style="list-style-type: none"> <li>➤ Wear respirators or cover mouth and nose with wet cloth.</li> </ul>                                                                                                                 |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Handling of ingredients</li> </ul>                                  | <ul style="list-style-type: none"> <li>➤ Hands may get injured</li> </ul>                           | <ul style="list-style-type: none"> <li>➤ Use gloves &amp; other PPE.</li> </ul>                                                                                                                                              |
|                                                                                               | <ul style="list-style-type: none"> <li>➤ Protruding reinforcement rods.</li> </ul>                           | <ul style="list-style-type: none"> <li>➤ Feet may get injured</li> </ul>                            | <ul style="list-style-type: none"> <li>➤ Use Safety shoes</li> <li>➤ Provide platform above reinforcement for movement of workers.</li> </ul>                                                                                |

APPENDIX-E : (Sheet 3 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY           | TYPE OF HAZARD                                                       | EFFECT OF HAZARD                                         | PREVENTIVE MEASURES                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | ➤ Earthing of electrical mixers, vibrators, etc. not done.           | ➤ Can cause electrocution/asphyxiation                   | ➤ Ensure earthing of equipments and proper functioning of electrical circuit before commencement of work.                                                                                                |
|                    | ➤ Falling of materials from height                                   | ➤ Persons may get injured                                | ➤ Use hard hats<br>➤ Remove surplus material immediately from work place.<br>➤ Ensure lighting arrangements during night hours                                                                           |
|                    | ➤ Continuous pouring by same gang                                    | ➤ Cause tiredness of workers and may lead to accident.   | ➤ Insist on shift pattern<br>➤ 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 hooper<br>➤ Provide safety cages around moving motors<br>➤ Ensure proper mechanical locking of vibrator                                                                         |
| ● Super-structure  | ➤ Same as above plus<br>➤ Deflection in props or shuttering material | ➤ Shuttering/props may collapse and prove fatal          | ➤ Avoid excessive stacking on shuttering material<br>➤ Check the design and strength of shuttering material before commencement of work<br>➤ 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.<br>➤ 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.<br>➤ Avoid usage of shift tools                                                                                                                              |
|                    | ➤ Carrying of rods for short distances/at heights                    | ➤ Workers may get injured their hands and shoulders.     | ➤ Provide suitable pads on shoulders and use safety gloves.<br>➤ Tie up rods in easily liftable bundles<br>➤ 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 fell down                  | ➤ Use safety shoes and avoid standing unnecessarily on cantilever rods<br>➤ Avoid wearing of loose clothes                                                                                               |

APPENDIX-E : (Sheet 4 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY                             | TYPE OF HAZARD                                                   | EFFECT OF HAZARD                      | PREVENTIVE MEASURES                                                                                                                                                                                                                                                      |
|--------------------------------------|------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | ➤ Falling of material from height                                | ➤ May prove fatal                     | ➤ Use helmets<br>➤ Provide safety nets                                                                                                                                                                                                                                   |
|                                      | ➤ Transportation of rods by trucks/trailers                      | ➤ Protruded rods may hit the persons  | ➤ Use red flags/lights at the ends<br>➤ Do not protrude the rods in front of or by the side of driver's cabin.<br>➤ Do not extend the rods 1/3 <sup>rd</sup> of deck length or 1.5m whichever is less                                                                    |
| (D)<br>WELDING<br>AND GAS<br>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.<br>➤ Avoid thoriated tungsten electrodes for GTAW                                                                                                                                             |
|                                      | ➤ Improper placement of oxygen and acetylene cylinders           | ➤ Explosion may occur                 | ➤ Move out any leaking cylinder<br>➤ Keep cylinders in vertical position<br>➤ Use trolley for transportation of cylinders and chain them<br>➤ Use flashback arrestors                                                                                                    |
|                                      | ➤ Leakage/cuts in hoses                                          | ➤ May cause fire                      | ➤ Purge regulators immediately and then turn off<br>➤ Never use grease or oil on oxygen line connections and copper fittings on acetylene lines<br>➤ Inspect regularly gas carrying hoses<br>➤ 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<br>➤ Turn valve slowly to avoid bursting<br>➤ 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<br>➤ Never attach the ground cable to tanks, container or pipe storing flammable liquids<br>➤ Never use LPG for gas cutting                                                                                                          |

APPENDIX-E : (Sheet 5 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES ...(Contd.)

| ACTIVITY                                 | TYPE OF HAZARD                                     | EFFECT OF HAZARD                                                                             | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (E)<br>RADIOGRAPHY                       | ➤ Ionizing radiation                               | ➤ Radiations may react with the skin and can cause cancer, skin irritation, dermatitis, etc. | <ul style="list-style-type: none"> <li>➤ Ensure Safety regulations as per BARC/AERB before commencement of job.</li> <li>➤ Cordon off the area and install Radiation warning symbols</li> <li>➤ Restrict the entry of unauthorized persons</li> <li>➤ Wear appropriate PPE and film badges issued by BARC/AERB</li> </ul>                                                                                                                                                                                                                                                                                  |
|                                          | ➤ Transportation and Storage of Radiography source | ➤ Same as above                                                                              | <ul style="list-style-type: none"> <li>➤ Never touch or handle radiography source with hands</li> <li>➤ 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.</li> <li>➤ Radiography source should never be carried either in passenger bus or in a passenger compartment of trains.</li> <li>➤ BARC/AERB have to be informed before source movement.</li> <li>➤ Permission from Director General of Civil Aviation is required for booking radio isotopes with airlines.</li> </ul>                         |
|                                          | ➤ Loss of Radio isotope                            | ➤ Same as above                                                                              | <ul style="list-style-type: none"> <li>➤ Try to locate with the help of Survey Meter.</li> <li>➤ Inform BARC/AERB (*)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (F)<br>ELECTRICAL INSTALLATION AND USAGE | ➤ Short circuiting                                 | ➤ Can cause Electrocutation or Fire                                                          | <ul style="list-style-type: none"> <li>➤ Use rubberized hand gloves and other PPE</li> <li>➤ Don't lay wires under carpets, mats or door ways.</li> <li>➤ Allow only licensed electricians to perform on electrical facilities</li> <li>➤ Use one socket for one appliance</li> <li>➤ Ensure usage of only fully insulated wires or cables</li> <li>➤ Don't place bare wire ends in a socket</li> <li>➤ Ensure earthing of machineries and equipments</li> <li>➤ Do not use damaged cords and avoid temporary connections</li> <li>➤ Use spark-proof/flame proof type field distribution boxes.</li> </ul> |

(\*) Atomic Energy Regulatory Board (AERB),  
Bhabha Atomic Research Centre (BARC)  
Anushaktinagar, Mumbai – 400 094

**APPENDIX-E : (Sheet 6 of 12)**

**CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)**

| ACTIVITY                                       | TYPE OF HAZARD                                                            | EFFECT OF HAZARD                                   | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                |                                                                           |                                                    | <ul style="list-style-type: none"> <li>➤ Do not allow open/bare connections</li> <li>➤ Provide all connections through ELCB</li> <li>➤ Protect electrical cables/equipment's from water and naked flames</li> <li>➤ Check all connections before energizing</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                | ➤ Overloading of Electrical System                                        | ➤ Bursting of system can occur which leads to fire | <ul style="list-style-type: none"> <li>➤ Display voltage and current ratings prominently with 'Danger' signs.</li> <li>➤ Ensure approved cable size, voltage grade and type</li> <li>➤ Switch off the electrical utilities when not in use</li> <li>➤ Do not allow unauthorized connections.</li> <li>➤ Ensure proper grid wise distribution of Power</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                | ➤ Improper laying of overhead and underground transmission lines/cables   | ➤ Can cause electrocution and prove fatal          | <ul style="list-style-type: none"> <li>➤ Do not lay unarmoured cable directly on ground, wall, roof of trees</li> <li>➤ Maintain atleast 3m distance from HT cables</li> <li>➤ All temporary cables should be laid atleast 750 mm below ground on 100 mm fine sand overlying by brick soling</li> <li>➤ Provide proper sleeves at crossings/ intersections</li> <li>➤ Provide cable route markers indicating the type and depth of cables at intervals not exceeding 30m and at the diversions/termination</li> </ul>                                                                                                                                                                                                                                                                                                        |
| (G)<br>FIRE<br>PREVENTION<br>AND<br>PROTECTION | ➤ Small fires can become big ones and may spread to the surrounding areas | ➤ Cause burn injuries and may prove fatal          | <ul style="list-style-type: none"> <li>➤ In case a fire breaks out, press fire alarm system and shout "Fire, Fire"</li> <li>➤ Keep buckets full of sand &amp; water/ fire extinguishing equipment near hazardous locations</li> <li>➤ Confine smoking to 'Smoking Zones' only.</li> <li>➤ Train people for using specific type of fire fighting equipments under different classes of fire</li> <li>➤ Keep fire doors/shutters, passages and exit doors unobstructed</li> <li>➤ Maintain good house keeping and first-aid boxes (for details refer Appendix-B)</li> <li>➤ Don't obstruct access to Fire extinguishers.</li> <li>➤ Do not use elevators for evacuation during fire.</li> <li>➤ Maintain lightning arrestors for elevated structures</li> <li>➤ Stop all electrical motors with internal combustion</li> </ul> |

APPENDIX-E : (Sheet 7 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY                     | TYPE OF HAZARD                                      | EFFECT OF HAZARD                                                                                       | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                                                     |                                                                                                        | <ul style="list-style-type: none"> <li>➤ Move the vehicles from dangerous locations</li> <li>➤ Remove the load hanging from the crane booms</li> <li>➤ Remain out of the danger areas.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                              | ➤ Improper selection of Fire extinguisher           | ➤ It may not extinguish the fire                                                                       | <ul style="list-style-type: none"> <li>➤ Ensure usage of correct fire extinguisher meant for the specified fire (for details refer Appendix-C).</li> <li>➤ Do not attempt to extinguish Oil and electric fires with water. Use foam cylinders/CO<sub>2</sub>/sand or earth.</li> </ul>                                                                                                                                                                                                                                                                                                                                        |
|                              | ➤ Improper storage of highly inflammable substances | ➤ Same as above                                                                                        | <ul style="list-style-type: none"> <li>➤ Maintain safe distance of flammable substances from source of ignition</li> <li>➤ Restrict the distribution of flammable materials to only min. necessary amount</li> <li>➤ Construct specifically designed fuel storage facilities</li> <li>➤ Keep chemicals in cool and dry place away from heat. Ensure adequate ventilation</li> <li>➤ Before welding operation, remove or shield the flammable material properly</li> <li>➤ Store flammable materials in stable racks, correctly labeled preferably with catchment trays.</li> <li>➤ Wipe off the spills immediately</li> </ul> |
|                              | ➤ Short circuiting of electrical system             | <ul style="list-style-type: none"> <li>➤ Same as above</li> <li>➤ Can cause Electrocutation</li> </ul> | <ul style="list-style-type: none"> <li>➤ Don't lay wires under carpets, mats or door ways</li> <li>➤ Use one socket for one appliance.</li> <li>➤ Use only fully insulated wires or cables</li> <li>➤ Do not allow open/bare connections</li> <li>➤ Provide all connections through ELCB</li> <li>➤ Ensure earthing of machinaries and equipments</li> </ul>                                                                                                                                                                                                                                                                  |
| (H)<br>VEHICULAR<br>MOVEMENT | ➤ Crossing the Speed Limits (Rash driving)          | ➤ Personal injury                                                                                      | <ul style="list-style-type: none"> <li>➤ Obey speed limits and traffic rules strictly</li> <li>➤ Always expect the unexpected and be a defensive driver</li> <li>➤ Use seat belts/helmets</li> <li>➤ Blow horn at intersections and during overtaking operations.</li> <li>➤ Maintain the vehicle in good condition</li> <li>➤ Do not overtake on curves, bridges and slopes</li> </ul>                                                                                                                                                                                                                                       |
|                              | ➤ Adverse weather condition                         | ➤ Same as Above                                                                                        | <ul style="list-style-type: none"> <li>➤ Read the road ahead and ride to the left</li> <li>➤ Keep the wind screen and lights clean</li> <li>➤ Do not turn at speed.</li> <li>➤ Recognize the hazard, understand the defense and act correctly in time.</li> </ul>                                                                                                                                                                                                                                                                                                                                                             |

**APPENDIX-E : (Sheet 8 of 12)**

**CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)**

| ACTIVITY                                           | TYPE OF HAZARD                                                                                                                  | EFFECT OF HAZARD                                                                     | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    | <ul style="list-style-type: none"> <li>➤ Consuming alcohol before and during the driving operation</li> </ul>                   | <ul style="list-style-type: none"> <li>➤ Same as above</li> </ul>                    | <ul style="list-style-type: none"> <li>➤ Alcohol and driving do not mix well. Either choose alcohol or driving.</li> <li>➤ If you have a choice between hitting a fixed object or an on-coming vehicle, hit the fixed object</li> <li>➤ Quit the steering at once and become a passenger. Otherwise take sufficient rest and then drive.</li> <li>➤ Do not force the driver to drive fast and round the clock.</li> <li>➤ Do not day dream while driving</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                    | <ul style="list-style-type: none"> <li>➤ Falling objects/ Mechanical failure</li> </ul>                                         | <ul style="list-style-type: none"> <li>➤ May prove fatal</li> </ul>                  | <ul style="list-style-type: none"> <li>➤ Ensure effective braking system, adequate visibility for the drives, reverse warning alarm..</li> <li>➤ Proper maintenance of the vehicle as per manufacturer instructions</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (I) PROOF TESTING (HYDROSTATIC /PNEUMATIC TESTING) | <ul style="list-style-type: none"> <li>➤ Bursting of piping</li> <li>➤ Collapse of tanks</li> <li>➤ Tanks flying off</li> </ul> | <ul style="list-style-type: none"> <li>➤ May cause injury and prove fatal</li> </ul> | <ul style="list-style-type: none"> <li>➤ Prepare test procedure &amp; obtain EIL/owner's approval</li> <li>➤ Provide separate gauge for pressurizing pump and piping/equipment</li> <li>➤ Check the calibration status of all pressure gauges, dead weight testers and temperature recorders</li> <li>➤ Take dial readings at suitable defined intervals and ensure most of them fall between 40-60% of the gauge scale range</li> <li>➤ Provide safety relief valve (set at pressure slightly higher than test pressure) while testing with air/ nitrogen</li> <li>➤ Ensure necessary precautions, stepwise increase in pressure, tightening of bolts/nuts, grouting, etc. before and during testing</li> <li>➤ Keep the vents open before opening any valve while draining out of water used for hydrotesting of tanks.</li> <li>➤ Pneumatic testing involves the hazard of released energy stored in compressed gas. Specific care must therefore be taken to minimize the chance of brittle failure during a pneumatic leak test. Test temperature is important in this regard and must be considered when the designer chooses the material of construction.</li> </ul> |

APPENDIX-E : (Sheet 9 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY               | TYPE OF HAZARD           | EFFECT OF HAZARD                                                 | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------|--------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                          |                                                                  | A pressure relief device shall be provided, having a set pressure not higher than the test pressure plus the lesser of 345 KPa (50 psi) or 10% of the test pressure.<br>The gas used as test fluid, if not air, shall be nonflammable and nontoxic.                                                                                                                                                                                                                                                                                                       |
| (J) WORKING AT HEIGHTS | ➤ Person can fall down   | ➤ May sustain severe injuries or prove fatal                     | <ul style="list-style-type: none"> <li>➤ Provide guard rails/barricade at the work place</li> <li>➤ Use PPE like full body harness, life line, helmets, safety shoes, etc.</li> <li>➤ Obtain a permit before starting the work at height above 3 meters</li> <li>➤ Fall arrest and safety nets, etc. must be installed</li> <li>➤ Provide adequate working space (min. 0.6 m)</li> <li>➤ Tie/weld working platform with fixed support</li> <li>➤ Use roof top walk ladder while working on a slopping roofs</li> <li>➤ Avoid movement on beams</li> </ul> |
|                        |                          | ➤ May hit the scrap/material stacked at the ground or in between | <ul style="list-style-type: none"> <li>➤ Keep the work place neat and clean</li> <li>➤ Remove the scrap immediately</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                        | ➤ Material can fall down | ➤ May hit the workers working at lower levels and prove fatal    | <ul style="list-style-type: none"> <li>➤ Same as above plus</li> <li>➤ Do not throw or drop materials or equipment from height. I.e. do not <i>bomb</i> materials</li> <li>➤ All tools to be carried in a tool-kit Bag or on working uniform</li> <li>➤ Remove scrap from the planks</li> <li>➤ Ensure wearing of helmet by the workers working at lower levels</li> </ul>                                                                                                                                                                                |
| (K) CONFINED SPACES    | ➤ Suffocation/drowning   | ➤ Unconsciousness, death                                         | <ul style="list-style-type: none"> <li>➤ Use respiratory devices, if reqd.</li> <li>➤ Avoid over crowding inside a confined space</li> <li>➤ Provide Exhaust fans for ventilation</li> <li>➤ Do not wear loose clothes, neck ties, etc</li> <li>➤ Fulfill conditions of the permit</li> </ul>                                                                                                                                                                                                                                                             |

APPENDIX-E : (Sheet 10 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY                            | TYPE OF HAZARD                                  | EFFECT OF HAZARD                                          | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------|-------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                                                 |                                                           | <ul style="list-style-type: none"> <li>➤ Check for presence of hydrocarbons, O<sub>2</sub> level</li> <li>➤ Obtain work permit before entering a confined space</li> <li>➤ Ensure that the connected piping of the equipment which is to be opened is pressure free, fluid has been drained, vents are open and piping is positively isolated by a blind flange</li> </ul>                                                                                                                                                                                                                                                                                                                         |
|                                     | ➤ Presence of foul smell and toxic substances   | ➤ Inhalation can pose threat to life                      | <ul style="list-style-type: none"> <li>➤ Same as above plus</li> <li>➤ Check for hydrocarbon and Aromatic compounds before entering a confined space</li> <li>➤ Depute one person outside the confined space for continuous monitoring and for extending help in case of an emergency</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                     | ➤ Ignition/ flame can cause fire                | ➤ Person may sustain burn injuries or explosion may occur | <ul style="list-style-type: none"> <li>➤ Keep fire extinguishers at a hand distance</li> <li>➤ Remove surplus material and scrap immediately</li> <li>➤ Do not smoke inside a confined space</li> <li>➤ Do not allow gas cylinders inside a confined space</li> <li>➤ Use low voltage (24V) lamps for lighting</li> <li>➤ Use tools with air motors or electric tools with max. voltage of 24V</li> <li>➤ Remove all equipments at the end of the day</li> </ul>                                                                                                                                                                                                                                   |
| (L) HANDLING AND LIFTING EQUIPMENTS | ➤ Failure of load lifting and moving equipments | ➤ Can cause accident and prove fatal                      | <ul style="list-style-type: none"> <li>➤ Avoid standing under the lifted load and within the operating radius of cranes</li> <li>➤ Check periodically oil, brakes, gears, horns and tyre pressure of all moving machinery</li> <li>➤ Check quality, size and condition of all chain pulley blocks, slings, U-clamps, D-shackles, wire ropes, etc.</li> <li>➤ Allow crane to move only on hard, firm and leveled ground.</li> <li>➤ Allow lifting slings as short as possible and check gunny packings at the friction points</li> <li>➤ Do not allow crane to tilt its boom while moving</li> <li>➤ Install Safe Load Indicator</li> <li>➤ Ensure certification by applicable authority</li> </ul> |

APPENDIX-E : (Sheet 11 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY                                          | TYPE OF HAZARD                      | EFFECT OF HAZARD                                     | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------|-------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | ➤ Overloading of lifting equipments | ➤ Same as above                                      | <ul style="list-style-type: none"> <li>➤ Safe lifting capacity of derricks and winches written on them shall be got verified</li> <li>➤ The max. safe working load shall be marked on all lifting equipments</li> <li>➤ Check the weight of columns and other heavy items painted on them and accordingly decide about the crane capacity, boom and angle of erection</li> <li>➤ Allow only trained operators and riggers during crane operation.</li> </ul>                                                                                                                         |
|                                                   | ➤ Overhead electrical wires         | ➤ Can cause electrocution and fire                   | <ul style="list-style-type: none"> <li>➤ Do not allow boom or other parts of crane to come within 3m reach of overhead HT cables</li> <li>➤ Hook and load being lifted shall preferably remain in full visibility of crane operators.</li> </ul>                                                                                                                                                                                                                                                                                                                                     |
| (M)<br>SCAFFOLDING,<br>FORMWORK<br>AND<br>LADDERS | ➤ Person can fall down              | ➤ Person May sustain severe injuries and prove fatal | <ul style="list-style-type: none"> <li>➤ Provide guard rails for working at height</li> <li>➤ Face ladder while climbing and use both hands.</li> <li>➤ Ladders shall extend about 1m above landing for easy access and tying up purpose</li> <li>➤ Do not place ladders against movable objects and maintain base at 1/4 unit of the working length of the ladder.</li> <li>➤ Suspended scaffolds shall not be less than 500 mm wide and tied properly with ropes</li> <li>➤ No loose planks shall be allowed</li> <li>➤ Use PPE, like helmets, safety shoes, Etc</li> </ul>        |
|                                                   | ➤ Failure of scaffolding material   | ➤ Same as above                                      | <ul style="list-style-type: none"> <li>➤ Inspect visually all scaffolding materials for stability and anchoring with permanent structures.</li> <li>➤ Design scaffolding for max. load carrying capacity.</li> <li>➤ Scaffolding planks shall not be less than 50X250 mm full thickness lumber or equivalent. These shall be cleated or secured and must extend over the end supports by atleast 150mm and not more than 300mm</li> <li>➤ Don't overload the scaffolds</li> <li>➤ Do not splice short ladders to make a longer one. Vertical ladders shall not exceed 6m.</li> </ul> |
|                                                   | ➤ Material can fall down            | ➤ Persons working at lower level gets injured        | <ul style="list-style-type: none"> <li>➤ Remove excess material and scrap immediately</li> <li>➤ Carry the tools in a tool-kit bag only</li> <li>➤ Provide safety nets</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                    |

APPENDIX-E : (Sheet 12 of 12)

CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES (...Contd.)

| ACTIVITY                   | TYPE OF HAZARD                           | EFFECT OF HAZARD               | PREVENTIVE MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (N)<br>STRUCTURAL<br>WORKS | ➤ Personal negligence and danger of fall | ➤ Can cause injury or casualty | <ul style="list-style-type: none"> <li>➤ Do not take rest inside rooms built for welding machines or electrical distribution system.</li> <li>➤ Avoid walking on beams at height</li> <li>➤ Wear helmet with chin strap and full body harness while working at height.</li> <li>➤ Use hand gloves and goggles during grinding operations</li> <li>➤ Cover or mark the sharp and projected edges</li> <li>➤ Do not stand within the operating radius of cranes</li> </ul> |
|                            | ➤ Lifting/ slipping of material          | ➤ Same as above                | <ul style="list-style-type: none"> <li>➤ Do not stand under the lifted load</li> <li>➤ Stack properly all the materials. Avoid slippage during handling</li> <li>➤ Control longer pieces lifted up by cranes from both ends</li> <li>➤ Remove loose materials from height</li> <li>➤ Ensure tightening of all nuts &amp; bolts</li> </ul>                                                                                                                                |
| (O)<br>PIPELINE<br>WORKS   | ➤ Erection/ lowering failure             | ➤ Can cause injury             | <ul style="list-style-type: none"> <li>➤ Do not stand under the lifted load</li> <li>➤ Do not allow any person to come within the radii of the side boom handling pipes</li> <li>➤ Check the load carrying capacity of the lifting tools &amp; tackles</li> <li>➤ Use safe Load Indicators</li> <li>➤ Use appropriate PPEs</li> </ul>                                                                                                                                    |
|                            | ➤ Other                                  | ➤ Same as above                | <ul style="list-style-type: none"> <li>➤ Wear gum boots in marshy areas</li> <li>➤ Allow only one person to perform signaling operations while lowering of pipes</li> <li>➤ Provide night caps on pipes</li> <li>➤ Provide end covers on pipes for stoppage of pigs while testing/ cleaning operations</li> </ul>                                                                                                                                                        |

**FORMAT NO. : HSE-1 REV 0**  
**HSE CHECKILIST CUM COMPLIANCE REPORT**

**(Sheet 1 of 6)**

PROJECT : \_\_\_\_\_ REPORT NO. : \_\_\_\_\_  
DATE : \_\_\_\_\_ CONTRACTOR : \_\_\_\_\_  
INSPECTION BY : \_\_\_\_\_ OWNER : \_\_\_\_\_  
FREQUENCY : FORTNIGHTLY JOB NO. : \_\_\_\_\_

Note : Write 'NA' wherever the item is not applicable

| SL. NO.   | ITEM                                       | YES | NO | REMARKS | ACTION |
|-----------|--------------------------------------------|-----|----|---------|--------|
| <b>1.</b> | <b>HOUSEKEEPING</b>                        |     |    |         |        |
| a)        | Waste containers provided and used         |     |    |         |        |
| b)        | Sanitary facilities adequate and Clean     |     |    |         |        |
| c)        | Passageways and Walkways Clear             |     |    |         |        |
| d)        | General neatness of working areas          |     |    |         |        |
| e)        | Other                                      |     |    |         |        |
| <b>2.</b> | <b>PERSONNEL PROTECTIVE EQUIPMENT</b>      |     |    |         |        |
| a)        | Goggles; Shields                           |     |    |         |        |
| b)        | Face protection                            |     |    |         |        |
| c)        | Hearing protection                         |     |    |         |        |
| d)        | Foot protection                            |     |    |         |        |
| e)        | Hand protection                            |     |    |         |        |
| f)        | Respiratory Masks etc.                     |     |    |         |        |
| g)        | Full body harness conforming to CC, EN 361 |     |    |         |        |
| h)        | Hard hat (HDPE)                            |     |    |         |        |
| i)        | Other                                      |     |    |         |        |
| <b>3.</b> | <b>EXCAVATIONS/OPENINGS</b>                |     |    |         |        |
| a)        | Openings properly covered or barricaded    |     |    |         |        |
| b)        | Excavations shored                         |     |    |         |        |
| c)        | Excavations barricaded                     |     |    |         |        |
| d)        | Overnight lighting provided                |     |    |         |        |
|           | Other                                      |     |    |         |        |

FORMAT NO.:HSE-1 REV 0  
(Sheet 2 of 6)

|    | ITEM                                         | YES | NO | REMARKS | ACTION |
|----|----------------------------------------------|-----|----|---------|--------|
| 4. | <b>WELDING &amp; GAS CUTTING</b>             |     |    |         |        |
| a) | Gas cylinders chained upright                |     |    |         |        |
| b) | Cables and hoses not obstructing             |     |    |         |        |
| c) | Screens or shields used                      |     |    |         |        |
| d) | Flammable materials protected                |     |    |         |        |
| e) | Live electrode bits contained properly       |     |    |         |        |
| f) | Fire extinguisher (s) accessible             |     |    |         |        |
| g) | Other                                        |     |    |         |        |
| 5. | <b>SCAFFOLDING &amp; BARRICADING</b>         |     |    |         |        |
| a) | Fully decked platforms                       |     |    |         |        |
| b) | Guard and intermediate rails in place        |     |    |         |        |
| c) | Toe boards in place                          |     |    |         |        |
| d) | Adequate shoring                             |     |    |         |        |
| e) | Adequate access                              |     |    |         |        |
| f) | Positive barricading for critical activities |     |    |         |        |
| g) | Installation of warning signs                |     |    |         |        |
| h) | Other                                        |     |    |         |        |
| 6. | <b>LADDERS</b>                               |     |    |         |        |
| a) | Extension side rails 1 m above               |     |    |         |        |
| b) | Top of landing                               |     |    |         |        |
| c) | Properly secured                             |     |    |         |        |
| d) | Angle + 70° from horizontal                  |     |    |         |        |
| e) | Other                                        |     |    |         |        |

**FORMAT NO.:HSE-1 REV 0**  
**(Sheet 3 of 6)**

|           | ITEM                                             | YES | NO | REMARKS | ACTION |
|-----------|--------------------------------------------------|-----|----|---------|--------|
| <b>7.</b> | <b>HOISTS, CRANES AND DERRICKS</b>               |     |    |         |        |
| a)        | Condition of cables and sheaves OK               |     |    |         |        |
| b)        | Condition of slings, chains, hooks and eyes O.K. |     |    |         |        |
| c)        | Inspection and maintenance logs maintained       |     |    |         |        |
| d)        | Outriggers used                                  |     |    |         |        |
| e)        | Signs/barricades provided                        |     |    |         |        |
| f)        | Signals observed and understood                  |     |    |         |        |
| g)        | Qualified operators                              |     |    |         |        |
| h)        | Other                                            |     |    |         |        |
| <b>8.</b> | <b>MACHINERY, TOOLS AND<br/>EQUIPMENT</b>        |     |    |         |        |
| a)        | Proper instruction                               |     |    |         |        |
| b)        | Safety devices                                   |     |    |         |        |
| c)        | Proper cords                                     |     |    |         |        |
| d)        | Inspection and maintenance                       |     |    |         |        |
| e)        | Other                                            |     |    |         |        |
| <b>9.</b> | <b>VEHICLE AND TRAFFIC</b>                       |     |    |         |        |
| a)        | Rules and regulations observed                   |     |    |         |        |
| b)        | Inspection and maintenance                       |     |    |         |        |
| c)        | Licensed drivers                                 |     |    |         |        |
| d)        | Other                                            |     |    |         |        |

**FORMAT NO.:HSE-1 REV 0**  
**(Sheet 4 of 6)**

|            | ITEM                                                                 | YES | NO | REMARKS | ACTION |
|------------|----------------------------------------------------------------------|-----|----|---------|--------|
| <b>10.</b> | <b>TEMPORARY FACILITIES</b>                                          |     |    |         |        |
| a)         | Emergency instructions posted                                        |     |    |         |        |
| b)         | Fire extinguishers provided                                          |     |    |         |        |
| c)         | Fire-aid equipment available                                         |     |    |         |        |
| d)         | Secured against storm damage                                         |     |    |         |        |
| e)         | General neatness                                                     |     |    |         |        |
| f)         | In accordance with electrical requirements                           |     |    |         |        |
| g)         | Other                                                                |     |    |         |        |
| <b>11.</b> | <b>FIRE PREVENTION</b>                                               |     |    |         |        |
| a)         | Personnel instructed                                                 |     |    |         |        |
| b)         | Fire extinguishers checked                                           |     |    |         |        |
| c)         | No smoking in Prohibited areas.                                      |     |    |         |        |
| d)         | Hydrants Clear                                                       |     |    |         |        |
| e)         | Other                                                                |     |    |         |        |
| <b>12.</b> | <b>ELECTRICAL</b>                                                    |     |    |         |        |
| a)         | Use of 3-core armored cables                                         |     |    |         |        |
| b)         | Usage of 'All insulated' or 'double-insulated' electrical tools      |     |    |         |        |
| c)         | All electrical connection are routed through ELCB                    |     |    |         |        |
| d)         | Natural Earthing at the source of power (Main DB)                    |     |    |         |        |
| e)         | Continuity and tightness of earth conductor                          |     |    |         |        |
| f)         | Covering of junction boxes, panels and other energized wiring places |     |    |         |        |
| g)         | Ground fault circuit interrupters provided                           |     |    |         |        |
| h)         | Prevention of tripping hazards                                       |     |    |         |        |
| f)         | Other                                                                |     |    |         |        |

**FORMAT NO.:HSE-1 REV 0**  
**(Sheet 5 of 6)**

|            | ITEM                                                                 | YES | NO | REMARKS | ACTION |
|------------|----------------------------------------------------------------------|-----|----|---------|--------|
| <b>14.</b> | <b>HANDLING AND STORAGE OF MATERIALS</b>                             |     |    |         |        |
| a)         | Properly stored or stacked                                           |     |    |         |        |
| b)         | Passageways clear                                                    |     |    |         |        |
| c)         | Other                                                                |     |    |         |        |
| <b>15.</b> | <b>FLAMMABLE GASES AND LIQUIDS</b>                                   |     |    |         |        |
| a)         | Containers clearly identified                                        |     |    |         |        |
| b)         | Proper storage                                                       |     |    |         |        |
| c)         | Fire extinguishers nearby                                            |     |    |         |        |
| d)         | Other                                                                |     |    |         |        |
| <b>16.</b> | <b>WORKING AT HEIGHT</b>                                             |     |    |         |        |
| a)         | Erection plan and work permit obtained                               |     |    |         |        |
| b)         | Safety nets                                                          |     |    |         |        |
| c)         | Full body harness and lanyards; chute lines                          |     |    |         |        |
| d)         | Health Check record available for workers going up?                  |     |    |         |        |
| e)         | Other                                                                |     |    |         |        |
| <b>17.</b> | <b>CONFINED SPACE</b>                                                |     |    |         |        |
| a)         | Work Permit obtained                                                 |     |    |         |        |
| b)         | Test for toxic gas and sufficient availability of oxygen conducted   |     |    |         |        |
| c)         | Atleast one person outside the confined space for monitoring deputed |     |    |         |        |
| d)         | Availability of sufficient means of entry, exit and ventilation      |     |    |         |        |
| e)         | Fire extinguisher and first-aid facility ensured                     |     |    |         |        |
| f)         | Lighting provision made by using 24V Lamp                            |     |    |         |        |
| g)         | Proper usage of PPEs ensured                                         |     |    |         |        |
| <b>18.</b> | <b>RADIOGRAPHY</b>                                                   |     |    |         |        |
| a)         | Proper storage and handling of source as per BARC/AERB guidelines    |     |    |         |        |
| b)         | Work permit obtained                                                 |     |    |         |        |

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(Sheet 6 of 6)

|     | ITEM                                                                                              | YES | NO | REMARKS | ACTION |
|-----|---------------------------------------------------------------------------------------------------|-----|----|---------|--------|
| c)  | Cordoning of the area done                                                                        |     |    |         |        |
| d)  | Use of appropriate PPE's ensured                                                                  |     |    |         |        |
| e)  | Proper training to workers/supervisors imparted                                                   |     |    |         |        |
| f)  | Minimum occupancy of workplace ensured                                                            |     |    |         |        |
| 19. | <b>HEALTH CHECKS</b>                                                                              |     |    |         |        |
| a)  | Workers medically examined and found be fit for working<br>i) at heights<br>ii) in confined space |     |    |         |        |
| b)  | Availability of First Aid facilities.                                                             |     |    |         |        |
| c)  | Proper sanitation at site, office and labour camps                                                |     |    |         |        |
| d)  | Arrangement of medical facilities.                                                                |     |    |         |        |
| e)  | Measures for dealing with illness.                                                                |     |    |         |        |
| f)  | Availability of Potable drinking water for workmen & staff.                                       |     |    |         |        |
| g)  | Provision of crèches for children.                                                                |     |    |         |        |
| h)  | Stand by vehicle available for evacuation of injured                                              |     |    |         |        |
| 20. | <b>ENVIRONMENT</b>                                                                                |     |    |         |        |
| a)  | Chemical and Other Effluents properly disposed                                                    |     |    |         |        |
| b)  | Cleaning liquid of pipes disposed off properly                                                    |     |    |         |        |
| c)  | Seawater used for hydro-testing disposed off as per agreed procedure                              |     |    |         |        |
| d)  | Lubricant Waste/Engine oils properly disposed                                                     |     |    |         |        |
| e)  | Waste from Canteen, offices, sanitation etc disposed properly                                     |     |    |         |        |
| f)  | Disposal of surplus earth, stripping materials, Oily rags and combustible materials done properly |     |    |         |        |
| g)  | Green belt protection                                                                             |     |    |         |        |

Signature of Resident  
Engr. With Seal

FORMAT NO. : HSE-2 REV 0  
ACCIDENT/INCIDENT REPORT

(To be submitted by contractor after every Accident/ Incident within 24 hours)

Report No.: \_\_\_\_\_

Name of Site: \_\_\_\_\_

Date: \_\_\_\_\_

Name of work: \_\_\_\_\_

Contractor: \_\_\_\_\_

Type of Accident/ Incident: ☐ Fatal ☐ Other Lost Time ☐ Non Loss Time ☐ First-Aid case

-----  
Name of the injured :

Age :

Father's name :

Sub-contractor M/s :

Date & time of Accident/ Incident :

Location :

-----  
Brief description of Accident/ Incident

-----  
Cause of Accident/ Incident

-----  
Nature of injury/damage

-----  
Medical Aid provided/actions taken

-----  
Intimation to local authorities (if applicable)

-----  
**Signature of contractor  
with seal**

To : Owner  
: RCM/Site-in-charge EIL (3 copies)

└─> Divisional Head (Constn) through RCM  
└─> Project Manager EIL, through RCM

FORMAT NO. : HSE-3 REV 0  
SUPPLEMENTARY ACCIDENT/  
INCIDENT INVESTIGATION REPORT

Supplementary to Report No: \_\_\_\_\_ (Copy enclosed)

Project : \_\_\_\_\_ Site : \_\_\_\_\_

Name of work : \_\_\_\_\_ Dated : \_\_\_\_\_

Contractor : \_\_\_\_\_ Work Order/LOI No. \_\_\_\_\_

Name of the Injured : \_\_\_\_\_ Age : \_\_\_\_\_

Sub-Contractor M/s : \_\_\_\_\_

Date & Time of Accident/ Incident : \_\_\_\_\_ Location : \_\_\_\_\_

Brief Description & Cause of Accident/ Incident

Nature of Injury/Damage

Comments of Medical Practitioner, who attended the victim/injured

Suggested improvement in the working condition, if any

Loss of man days and impact on site works

Any other comment by Safety Officer

Signature of Contractor  
with Seal

To : Owner  
: RCM/Site-in-charge EIL (3 copies)

→ Divisional Head (Constn) through RCM  
→ Project Manager EIL, through RCM

FORMAT NO. : HSE-4 REV 0  
NEAR MISS INCIDENT – SUGGESTED PROFORMA

Report No.: \_\_\_\_\_

Name of Site: \_\_\_\_\_

Date: \_\_\_\_\_

Name of work: \_\_\_\_\_

Contractor: \_\_\_\_\_

Incident reported by :

Date & Time of Incident :

Location :

Brief description of incident

Probable cause of incident

Suggested corrective action

Steps taken to avoid recurrence

Yes ☐

No ☐

Signature of Contractor  
with seal

To : Owner  
: RCM/Site-in-charge EIL (3 copies)

→ Divisional Head (Constn) through RCM  
→ Project Manager EIL, through RCM

**FORMAT NO. : HSE-5 REV 0**  
**MONTHLY HEALTH, SAFETY & ENVIRONMENT (HSE) REPORT**  
**(To be submitted by each Contractor)**

Actual work start Date : \_\_\_\_\_ For the Month of : \_\_\_\_\_

Project : \_\_\_\_\_ Report No : \_\_\_\_\_

Name of the Contractor : \_\_\_\_\_ Status as on : \_\_\_\_\_

Name of Work : \_\_\_\_\_ Job No : \_\_\_\_\_

(Wherever web based package is available, the contractor shall feed the record in that)

| ITEM                                                                            |            | UPTO PREVIOUS MONTH |  | THIS MONTH | CUMU-LATIVE |
|---------------------------------------------------------------------------------|------------|---------------------|--|------------|-------------|
| 1) Average number of Staff & Workmen<br>(average daily headcount, not man days) |            |                     |  |            |             |
| 2) Manhours worked                                                              |            |                     |  |            |             |
| 3) Number of Induction programmes conducted                                     |            |                     |  |            |             |
| 4) Number of HSE meetings organized at site                                     |            |                     |  |            |             |
| 5) Number of HSE awareness programmes conducted at site                         |            |                     |  |            |             |
| 6) Number of Tool Box Meetings conducted                                        |            |                     |  |            |             |
| 7) Number of Lost Time Accidents (LTA)                                          | Fatal      |                     |  |            |             |
|                                                                                 | Other LTA  |                     |  |            |             |
| 8) Number of Loss Time Injuries (LTI)                                           | Fatalities |                     |  |            |             |
|                                                                                 | Other LTI  |                     |  |            |             |
| 9) Number of Non-Loss Time Accidents                                            |            |                     |  |            |             |
| 10) Number of First Aid Cases                                                   |            |                     |  |            |             |
| 11) Number of Near Miss Incidents                                               |            |                     |  |            |             |
| 12) No. of unsafe acts/ practices detected                                      |            |                     |  |            |             |
| 13) No. of disciplinary actions taken against staff/ workmen                    |            |                     |  |            |             |
| 14) Man-days lost due to accidents                                              |            |                     |  |            |             |
| 15) LTA Free Manhours i.e. Number of LTA free manhours from the Last LTA        |            |                     |  |            |             |
| 16) Frequency Rate (No. of LTA per 2 lacs manhours worked)                      |            |                     |  |            |             |
| 17) Severity Rate (No. of man days lost per 2 lacs manhours worked)             |            |                     |  |            |             |
| 18) Loss Time Injury Frequency (No. of LTI per 2 lacs manhours worked)          |            |                     |  |            |             |
| 19) No. of activities for which Job Safety Analysis (JSA) completed             |            |                     |  |            |             |
| 20) No. of incentives/ awards given                                             |            |                     |  |            |             |
| 21) No. of occasions on which penalty imposed by EIL/ Owner                     |            |                     |  |            |             |
| 22) No. of Audits conducted                                                     |            |                     |  |            |             |
| 23) No. of pending NCs in above Audits                                          |            |                     |  |            |             |
| 24) Compensation cases raised with Insurance                                    |            |                     |  |            |             |
| 25) Compensation cases resolved and paid to workmen                             |            |                     |  |            |             |
| 26) Whether workmen compensation policy taken                                   |            | Yes                 |  | No         |             |
| 27) Whether workmen compensation policy is valid                                |            | Yes                 |  | No         |             |
| 28) Whether workmen registered under ESI Act, as applicable                     |            | Yes                 |  | No         |             |
| Remarks, if any                                                                 |            |                     |  |            |             |

Date :

**Safety Officer/Resident Engineer**  
**(Signature and Name)**

To : - OWNER  
- RCM EIL (2 copies)

FORMAT NO. : HSE-6 REV 0  
PERMIT FOR WORKING AT HEIGHT (ABOVE 2 METER)

(Sheet 1 of 2)

Project site \_\_\_\_\_  
Name of the work \_\_\_\_\_  
Name of Contractor \_\_\_\_\_  
Total No. of workers \_\_\_\_\_

Sr.No. \_\_\_\_\_  
Date \_\_\_\_\_  
Nature of work \_\_\_\_\_  
Exact location of work \_\_\_\_\_  
Duration of work: from \_\_\_\_\_ to \_\_\_\_\_

The following items have been checked and compliance shall be ensured during the currency of the permit:

| SL. No. | ITEM                                                                                     | DONE                     | NOT REQD.                |
|---------|------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1.      | Equipment/Work Area inspected                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Considered hazard from other routine/non-routine operations and concerned person alerted | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | ELCB provided                                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | Proper lighting provided                                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | Area cordoned off.                                                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Precautions against public traffic taken                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Sound Scaffolding provided                                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Adequate protected Platform provided                                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Access and Exit to the area<br>(Ladder properly fixed)                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Floor Openings covered                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Safety Net provided                                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Health check of personnel                                                                | <input type="checkbox"/> | <input type="checkbox"/> |

- A. Following personal protective equipment/measures are provided (✓ mark) and used as relevant: Hard hat /Gloves/Goggles/Shoes/Face Shield/Life line/Full body safety harness/ Roof top walk ladder/Any other(pl. specify)
- B. This permit shall be available at the work site at all times.
- C. Permit shall be issued for maximum one week only (Monday to Sunday)
- D. This permit shall be applicable in non-operational areas.
- E. After completion of the work, used permits shall be preserved for record purposes
- F. Additional precautions, if any \_\_\_\_\_

Permission is granted to work (See overleaf) = Yes/No

Name of Contractor's supervisor  
(Initiator)

Name of Contractor's Safety Officer  
(Issuing Authority)

**FORMAT NO. : HSE-6 REV 0**  
**(Sheet 2 of 2)**

## GRANT OF PERMIT AND EXTENSIONS

| Sl<br>No. | Validity Period<br>From _____<br>To _____ | Work Time<br>From _____ Hrs.<br>To _____ Hrs | Initiator<br>(Supervisor of<br>Contractor) | Issuing Authority<br>(Safety Officer)<br>of Contractor | Verification<br>by EIL<br>with date |
|-----------|-------------------------------------------|----------------------------------------------|--------------------------------------------|--------------------------------------------------------|-------------------------------------|
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |
|           |                                           |                                              |                                            |                                                        |                                     |

Additional safety instructions, if any:-

FORMAT NO. : HSE-7 REV 0  
CONFINED SPACE ENTRY PERMIT

Project site \_\_\_\_\_  
Name of the work \_\_\_\_\_  
Name of Contractor \_\_\_\_\_  
Exact location of work \_\_\_\_\_

Sr.No. \_\_\_\_\_  
Date \_\_\_\_\_  
Nature of work \_\_\_\_\_

**Safety Requirements POSITIVE ISOLATION OF THE VESSEL IS MANDATORY**

**(A) Has the equipment been ?**

| Y                        | NR                       |                                | Y                        | NR                       |                               | Y                        | NR                       |                           |
|--------------------------|--------------------------|--------------------------------|--------------------------|--------------------------|-------------------------------|--------------------------|--------------------------|---------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | isolated from power/steam/air  | <input type="checkbox"/> | <input type="checkbox"/> | water flushed &/or steamed    | <input type="checkbox"/> | <input type="checkbox"/> | radiation sources removed |
| <input type="checkbox"/> | <input type="checkbox"/> | isolated from liquid or gases  | <input type="checkbox"/> | <input type="checkbox"/> | Manways open & ventilated     | <input type="checkbox"/> | <input type="checkbox"/> | proper lighting provided  |
| <input type="checkbox"/> | <input type="checkbox"/> | depressurized &/or drained     | <input type="checkbox"/> | <input type="checkbox"/> | cont. inert gas flow arranged | <input type="checkbox"/> | <input type="checkbox"/> |                           |
| <input type="checkbox"/> | <input type="checkbox"/> | blanked/ blinded/ disconnected | <input type="checkbox"/> | <input type="checkbox"/> | adequately cooled             | <input type="checkbox"/> | <input type="checkbox"/> |                           |

**(B) Expected Residual Hazards**

|                          |                          |                        |                          |                          |                          |                          |                          |                                |
|--------------------------|--------------------------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | lack of O <sub>2</sub> | <input type="checkbox"/> | <input type="checkbox"/> | combustible gas/ liquid  | <input type="checkbox"/> | <input type="checkbox"/> | H <sub>2</sub> S / toxic gases |
| <input type="checkbox"/> | <input type="checkbox"/> | corrosive chemicals    | <input type="checkbox"/> | <input type="checkbox"/> | pyrophoric iron / scales | <input type="checkbox"/> | <input type="checkbox"/> | electricity / static           |
| <input type="checkbox"/> | <input type="checkbox"/> | heat/ steam / frost    | <input type="checkbox"/> | <input type="checkbox"/> | high humidity            | <input type="checkbox"/> | <input type="checkbox"/> | ionizing radiation             |
| <input type="checkbox"/> | <input type="checkbox"/> |                        | <input type="checkbox"/> | <input type="checkbox"/> |                          | <input type="checkbox"/> | <input type="checkbox"/> |                                |

**(C) Protection Measures**

|                          |                          |                                 |                          |                          |                              |                          |                          |                         |
|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|------------------------------|--------------------------|--------------------------|-------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | gloves                          | <input type="checkbox"/> | <input type="checkbox"/> | ear plug / muff              | <input type="checkbox"/> | <input type="checkbox"/> | goggles / face shield   |
| <input type="checkbox"/> | <input type="checkbox"/> | protective clothing             | <input type="checkbox"/> | <input type="checkbox"/> | dust / gas / air line mask   | <input type="checkbox"/> | <input type="checkbox"/> | personal gas alarm      |
| <input type="checkbox"/> | <input type="checkbox"/> | grounded air educter/blower /AC | <input type="checkbox"/> | <input type="checkbox"/> | attendant with SCBA/air mask | <input type="checkbox"/> | <input type="checkbox"/> | rescue equipment/team   |
| <input type="checkbox"/> | <input type="checkbox"/> | Fire fighting arrangements      | <input type="checkbox"/> | <input type="checkbox"/> | safety harness & lifeline    | <input type="checkbox"/> | <input type="checkbox"/> | communication equipment |
| <input type="checkbox"/> | <input type="checkbox"/> |                                 | <input type="checkbox"/> | <input type="checkbox"/> |                              | <input type="checkbox"/> | <input type="checkbox"/> |                         |

**Authorization / Renewal (It is safe to enter the confined space)**

| Date | No. of persons allowed | Name of persons allowed | Signature               |                             | Time |    | Signature |
|------|------------------------|-------------------------|-------------------------|-----------------------------|------|----|-----------|
|      |                        |                         | Contractor's Supervisor | Contractor's Safety Officer | From | To | Workman   |
|      |                        |                         |                         |                             |      |    |           |
|      |                        |                         |                         |                             |      |    |           |

**Permit Closure :**

(A) Entry ☐ was closed ☐ stopped ☐ will continue on ...

(B) ☐ Site left in a safe condition  
☐ Housekeeping done

(C) Multilock ☐ removed ☐ key transferred  
☐ Ensured all men have come out ☐ Manways barricaded

Remarks, if any:

FORMAT NO. : HSE-8 REV 0  
RADIATION WORK PERMIT

Project : Sr.No. :  
Name of the work : Date :  
Name of contractor : Job No. :

Location of work :

Source strength :

Cordoned distance (m) :

Name of Radiographing agency :

Approved by Owner/EIL ☐

No. of workers engaged :

The following items have been checked & compliance shall be ensured during currency of the permit:

| S. No. | Item description                                                                            | Done                     |
|--------|---------------------------------------------------------------------------------------------|--------------------------|
| 1.     | Safety regulations as per BARC/AERB ensured while source in use/in transit & during storage | <input type="checkbox"/> |
| 2.     | Area cordoned off                                                                           | <input type="checkbox"/> |
| 3.     | Lighting arrangements for working during nights ensured                                     | <input type="checkbox"/> |
| 4.     | Warning signs/ flash lights installed                                                       | <input type="checkbox"/> |
| 5.     | Cold work permit taken (if applicable)                                                      | <input type="checkbox"/> |
| 6.     | PPEs like film badges, dosimeters used                                                      | <input type="checkbox"/> |

Additional precautions, if any \_\_\_\_\_

(Radiography Agency's BARC/AERB authorized Supervisor)

(Contractor's Safety Officer)

**Permission is granted.**

Permit is valid from \_\_\_\_\_ AM/PM \_\_\_\_\_ Date to \_\_\_\_\_ AM/PM \_\_\_\_\_  
Date

(Signature of permit issuing authority)

Name : Designation : Date :

**Permit renewal :**

| Permit extended upto |      | Additional precautions required, if any | Sign of issuing authority with date |
|----------------------|------|-----------------------------------------|-------------------------------------|
| Date                 | Time |                                         |                                     |
|                      |      |                                         |                                     |
|                      |      |                                         |                                     |
|                      |      |                                         |                                     |

Work completed/ stopped/ area cleared at \_\_\_\_\_ Hrs of Date \_\_\_\_\_

(Sign. of permit issuing authority)

Name :

FORMAT NO. : HSE-9 REV 0  
DEMOLISHING/DISMANTLING WORK PERMIT

Project : Sr.No. :  
Name of the work : Date :  
Name of contractor : Job No.:

Name of sub-contractor : No. of workers to be engaged :

Line No./ Equipment No./ Structure to be dismantled :

Location details of dismantling/ demolition with sketch : (clearly indicate the area)

The following items have been checked & compliance shall be ensured during currency of the permit:

| S. No. | Item description                                          | Done                     | Not Applicable           |
|--------|-----------------------------------------------------------|--------------------------|--------------------------|
| 1.     | Services like power, gas supply, water, etc. disconnected | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.     | Dismantling/ Demolishing method reviewed & approved       | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.     | Usage of appropriate PPEs ensured                         | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.     | Precautions taken for neighbouring structures             | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.     | First-Aid arrangements made                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.     | Fire fighting arrangements ensured                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.     | Precautions taken for blasting                            | <input type="checkbox"/> | <input type="checkbox"/> |

(Contractor's Supervisor)

(Contractor's Safety Officer)

Permission is granted.

(Permit issuing authority)

Name :  
Date :

Completion report :

Dismantling/ Demolishing is completed on \_\_\_\_\_ Date at \_\_\_\_\_ Hrs.

Materials/ debris transported to identified location ☐ Tagging completed (as applicable) ☐

Services like power, gas supply, water, etc. restored ☐

(Permit issuing authority)

| ELECTRICAL | NO. | DATE     | REVISION           | BY           | CHECKED      | CONVENOR           | CHAIRMAN (S.B.)    |
|------------|-----|----------|--------------------|--------------|--------------|--------------------|--------------------|
|            | 0   | 04.12.01 | ISSUED AS STANDARD | <i>Patil</i> | <i>anant</i> | <i>[Signature]</i> | <i>[Signature]</i> |

ELECTRICAL POWER IS THE MAINSTAY OF ANY CONSTRUCTION ACTIVITY. AT THE SAME TIME IT REQUIRES UTMOST CARE IN IT'S UTILISATION TO AVOID ACCIDENTS DUE TO ELECTRICAL SHOCK, FIRE INCIDENTS OR ELECTRIC SHORT CIRCUITS. EXPOSURE OF ELECTRICAL INSTALLATION TO ADVERSE ENVIRONMENTAL CONDITIONS INCREASE THE RISK OF SUCH ACCIDENTS. HENCE IT IS NECESSARY TO TAKE EXTRA PRECAUTIONS FOR SUCH INSTALLATIONS TO ENSURE SAFETY OF PERSONNEL AND EQUIPMENT. THIS STANDARD ADDRESSES THE SAFETY MEASURES REQUIRED TO BE ADOPTED FOR THE ELECTRICAL INSTALLATIONS BY ALL CONTRACTORS DURING CONSTRUCTION PHASE.

1. ALL ELECTRICAL CONNECTIONS/WORK FOR ELECTRICAL INSTALLATIONS SHALL BE CARRIED OUT AS PER PROVISIONS OF THE LATEST REVISION OF THE FOLLOWING CODES AND STANDARDS IN ADDITION TO THE REQUIREMENTS OF STATUTORY AUTHORITIES AND IE RULES:  
OISD-STD-173 : FIRE PREVENTION AND PROTECTION SYSTEM FOR ELECTRICAL INSTALLATIONS.  
SP-30 (BIS) : NATIONAL ELECTRIC CODE.  
THE INSTALLATION SHALL HAVE APPROVAL FROM CONCERNED STATUTORY AUTHORITIES.
2. ALL ELECTRICAL CONNECTIONS SHALL BE DONE BY AN ELECTRICIAN WITH VALID LICENCE AND TO THE SATISFACTION OF ENGINEER-IN-CHARGE.
3. ONE COMPETENT LICENCED ELECTRICIAN SHALL BE MADE AVAILABLE BY CONTRACTOR AT SITE ROUND THE CLOCK TO ATTEND TO THE NORMAL/EMERGENCY JOBS.
4. ALL SWITCH BOARDS/WELDING MACHINES SHALL BE KEPT IN WELL VENTILATED & COVERED SHED. THE SHED SHALL BE ELEVATED TO AVOID WATER LOGGING. NO FLAMMABLE MATERIALS SHALL BE USED FOR CONSTRUCTING THE SHED. ALSO FLAMMABLE MATERIALS SHALL NOT BE STORED IN AND AROUND ELECTRICAL EQUIPMENT/SWITCHBOARD. ADEQUATE CLEARANCES AND OPERATIONAL SPACE SHALL BE PROVIDED AROUND THE EQUIPMENT.
5. FIRE EXTINGUISHERS AND INSULATING MATS SHALL BE PROVIDED IN ALL POWER DISTRIBUTION CENTERS.
6. TEMPORARY ELECTRICAL EQUIPMENT SHALL NOT BE EMPLOYED IN HAZARDOUS AREAS WITHOUT OBTAINING SAFETY PERMIT.
7. PROPER HOUSE KEEPING SHALL BE DONE AROUND THE ELECTRICAL INSTALLATIONS.
8. ALL TEMPORARY INSTALLATIONS SHALL BE TESTED BEFORE ENERGISING, TO ENSURE PROPER EARTHING, BONDING, SUITABILITY OF PROTECTION SYSTEM, ADEQUACY OF FEEDERS/CABLES ETC.
9. ALL WELDERS SHALL USE HAND GLOVES IRRESPECTIVE OF HOLDER VOLTAGE.
10. MULTILINGUAL (ENGLISH, HINDI AND LOCAL LANGUAGE) CAUTION BOARDS, SHOCK TREATMENT CHARTS AND INSTRUCTION PLATE CONTAINING LOCATION OF ISOLATION POINT FOR INCOMING SUPPLY, NAME & TELEPHONE NO. OF CONTACT PERSON IN EMERGENCY SHALL BE PROVIDED IN SUBSTATIONS AND NEAR ALL DISTRIBUTION BOARDS/LOCAL PANELS.
11. OPERATION OF EARTH LEAKAGE DEVICE SHALL BE CHECKED REGULARLY BY TEMPORARILY CONNECTING SERIES TEST LAMP (2 BULBS OF EQUAL RATING CONNECTED IN SERIES) BETWEEN PHASE AND EARTH.
12. THE FOLLOWING DESIGN FEATURES SHALL BE ENSURED FOR ALL ELECTRICAL INSTALLATIONS DURING CONSTRUCTION PHASE.
  - 12.1 EACH INSTALLATION SHALL HAVE A MAIN SWITCH WITH A PROTECTIVE DEVICE, INSTALLED IN AN ENCLOSURE ADJACENT TO THE METERING POINT. THE OPERATING HEIGHT OF THE MAIN SWITCH SHALL NOT EXCEED 1.5 M. THE MAIN SWITCH SHALL BE CONNECTED TO THE POINT OF SUPPLY BY MEANS OF ARMOURED CABLE.
  - 12.2 THE OUTGOING FEEDERS SHALL BE DOUBLE OR TRIPLE POLE SWITCHES WITH FUSES/MCBs. LOADS IN A THREE PHASE CIRCUIT SHALL BE BALANCED AS FAR AS POSSIBLE AND LOAD ON NEUTRAL SHOULD NOT EXCEED 20% OF LOAD IN THE PHASE.

| ELECTRICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | NO. | DATE     | REVISION                                                                        | BY           | CHECKED       | CONVENOR                | CHAIRMAN (S.B.) |
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| <p>12.3 THE INSTALLATION SHALL BE ADEQUATELY PROTECTED AGAINST OVERLOAD, SHORT CIRCUIT AND EARTH LEAKAGE BY THE USE OF SUITABLE PROTECTIVE DEVICES. FUSES WHEREVER USED SHALL BE HRC TYPE. USE OF REWIRABLE FUSES SHALL BE STRICTLY PROHIBITED. THE EARTH LEAKAGE DEVICE SHALL HAVE AN OPERATING CURRENT NOT EXCEEDING 30 mA.</p> <p>12.4 ALL CONNECTIONS TO THE HANDTOOLS/WELDING RECEPTACLES SHALL BE TAKEN THROUGH PROPER SWITCHES, SOCKETS AND PLUGS.</p> <p>12.5 ALL SINGLE PHASE SOCKETS SHALL BE 3 PIN TYPE ONLY. ALL UNUSED SOCKETS SHALL BE PROVIDED WITH SOCKET CAPS.</p> <p>12.6 ONLY 3 CORE (P+N+E) OVERALL SHEATHED FLEXIBLE CABLES WITH MINIMUM CONDUCTOR SIZE OF 1.5 MM<sup>2</sup> COPPER SHALL BE USED FOR ALL HAND TOOLS.</p> <p>12.7 ONLY METALLIC DISTRIBUTION BOXES WITH DOUBLE EARTHING SHALL BE USED AT SITE. NO WOODEN BOXES SHALL BE USED.</p> <p>12.8 ALL POWER CABLES SHALL BE TERMINATED WITH COMPRESSION TYPE CABLE GLANDS. TINNED COPPER LUGS SHALL BE USED FOR MULTISTRAND WIRES/CABLES.</p> <p>12.9 CABLES SHALL BE FREE FROM ANY INSULATION DAMAGE.</p> <p>12.10 CABLES SHALL BE LAID UNDERGROUND AT A MINIMUM DEPTH OF 900 MM, COVERED WITH SAND, BRICK AND SOIL FOR ENSURING MECHANICAL PROTECTION. CABLES SHALL NOT BE LAID IN WATER LOGGED AREA AS FAR AS PRACTICABLE. CABLE ROUTE MARKERS SHALL BE PROVIDED AT EVERY 25 M OF BURIED TRENCH ROUTE. WHEN LAID ABOVE GROUND, CABLES SHALL BE PROPERLY CLEATED OR SUPPORTED ON RIGID POLES OF ATLEAST 2 M HIGH. MINIMUM HEAD CLEARANCE OF 6 METERS SHALL BE PROVIDED AT ROAD CROSSINGS.</p> <p>12.11 UNDER GROUND ROAD CROSSINGS FOR CABLES SHALL BE AVOIDED TO THE EXTENT FEASIBLE. IN ANY CASE NO UNDER GROUND POWER CABLE SHALL BE ALLOWED TO CROSS THE ROADS WITHOUT PIPE SLEEVE.</p> <p>12.12 ALL CABLE JOINTS SHALL BE DONE WITH PROPER JOINTING KIT. NO TAPED/TEMPORARY JOINTS SHALL BE USED.</p> <p>12.13 AN INDEPENDENT EARTHING FACILITY SHOULD PREFERABLY BE ESTABLISHED WITHIN THE TEMPORARY INSTALLATION PREMISES. ALL APPLIANCES AND EQUIPMENT SHALL BE ADEQUATELY EARTHED. IN CASE ARMoured CABLES ARE USED, THE ARMOUR SHALL BE BONDED TO THE EARTHING SYSTEM.</p> <p>12.14 ALL CABLES AND WIRE ROPE USED FOR EARTH CONNECTIONS SHALL BE TERMINATED THROUGH TINNED COPPER LUGS.</p> <p>12.15 IN CASE OF LOCAL EARTHING, EARTH ELECTRODES SHALL BE BURIED NEAR THE SUPPLY POINT AND EARTH CONTINUITY WIRE SHALL BE CONNECTED TO LOCAL EARTH PLATE FOR FURTHER DISTRIBUTION TO VARIOUS APPLIANCES. ALL INSULATED WIRES FOR EARTH CONNECTION SHALL HAVE INSULATION OF GREEN COLOUR.</p> <p>12.16 SEPARATE CORE SHALL BE PROVIDED FOR NEUTRAL. EARTH/STRUCTURES SHALL NOT BE USED AS A NEUTRAL IN ANY CASE.</p> <p>12.17 ON/OFF POSITION OF ALL SWITCHES SHALL BE CLEARLY DESIGNATED/PAINTED FOR EASY ISOLATION IN EMERGENCY.</p> <p>13. ALL INSULATIONS SHALL BE INSPECTED BY ENGINEER-IN-CHARGE ATLEAST ONCE IN A MONTH.</p> |     |          |                                                                                 |              |               |                         |                 |
|  <b>ENGINEERS INDIA LIMITED</b><br>NEW DELHI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |          | <b>SAFETY MEASURES FOR<br/>ELECTRICAL INSTALLATIONS<br/>DURING CONSTRUCTION</b> |              |               | STANDARD                | REV             |
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