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Annexure-I

**SPECIFICATION
HEALTH, SAFETY, SECURITY AND ENVIRONMENT
MANAGEMENT**

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ANNEXURE A-V :

SPECIFICATION HEALTH, SAFETY, SECURITY AND ENVIRONMENT MANAGEMENT

1. SCOPE

This document defines the requirements of the Owner / Consultant on Health, Safety and Environment (HSE) associated with the CONTRACTOR and any other agency to be practiced at construction worksites at all time. This specification establishes the Health, Safety and Environmental (HSE) management

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requirement to be complied by CONTRACTORS / Vendors including their Sub-CONTRACTORS / Sub vendors during construction for Project execution in Home office and Project site.

This specification is not intended to replace the necessary professional judgment needed to design & implement an effective HSE system for construction activities and the CONTRACTOR is expected to fulfil HSE requirements in this specification as minimum.

2. REFERENCE DOCUMENTS

The document should be read in conjunction with following:

- Applicable standards like Environmental management system and Occupational Health and Safety Standards
- Safety Practices during Constructions - OISD-192 and OISD-207
- OISD-STD-129 - Inspection of Storage Tanks
- OISD-RP-108 - Recommended Practices on Oil Storage and Handling
- OISD-GDN-166 - Guidelines for Occupational Health Monitoring in Oil and Gas Industry

3. DEFINITIONS & ABBREVIATIONS

AERB	:	Atomic Energy Regulatory Board
ANSI	:	American National Standards Institute
BARC	:	Bhabha Atomic Research Centre
BS	:	British Standard
CONSULTANT	:	Project Management Consultant
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

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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
JSA	:	Job Safety Analysis
LOTO	:	Lock Out & Tag Out
LPG	:	Liquefied Petroleum Gas
LSTK	:	Lump Sum Turn Key
MV	:	Medium Voltage
PPE	:	Personal Protective Equipment
RCM	:	Resident Construction Manager or Site-in-Charge
ROW	:	Right of Way
SCC	:	Special Conditions of Contract
SLI	:	Safe Load Indicator
TBT	:	Tool Box Talks

- The use of 'Shall' indicates a mandatory requirement.
- The use of 'Should' indicates a guideline that is strongly recommended.
- The use of 'May' indicates a guideline that is to be considered.
- 'HSE' means Health Safety and Environment.
- OWNER means Indian Oil Corporation Limited,
- PROJECT MANAGEMENT CONSULTANCY (Consultant) means Technip India Limited
- CONTRACTOR means the party with whom contractual relationship are formed by Owner / Consultant.
- SUBCONTRACTOR means the party with whom contractual relationship are formed by

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CONTRACTOR

HSE REQUIREMENTS TO BE COMPLIED BY BIDDERS

4. HSE GENERAL

4.1 Management Responsibility

4.1.1 HSE Policy & Objectives

The CONTRACTOR shall have a documented HSE policy and objectives to cover commitment of their organization to ensure Health, Safety and Environment aspects in their line operation. Within 4 weeks of the notification of acceptance of the tender, the CONTRACTOR shall submit a detailed and comprehensive Contract specific HSE Plan. The HSE Plan shall include detailed policies, procedures and regulations with detailed implementation will ensure compliance of the contract provisions.

The HSE Plan shall include the following but not be restricted to:

- A statement of the CONTRACTOR's policy, organization and arrangements for HSE.
- The name(s) and experience of person(s) within the CONTRACTOR's proposed Management who shall be responsible for coordinating and monitoring their HSE performance.
- The number of HSE staff who shall be employed on the Works, their responsibilities, authority and line of communication with the proposed CONTRACTOR's agent.
- A statement of the CONTRACTOR's procedures for identifying and estimating hazards, and the measures for addressing the same.
- A list of HSE hazards anticipated for this Contract and sufficient information to demonstrate the CONTRACTOR's proposals for achieving effective and efficient health and safety procedures;
- A description of the HSE training courses and emergency drills which shall be provided by the CONTRACTOR, with an outline of the syllabus to be followed.
- Details of the safety equipment which shall be provided by the CONTRACTOR, including personal protective equipment;
- A statement of the CONTRACTOR 's procedures for ensuring that CONTRACTOR 's

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Equipment used on the Project Site are maintained in a safe condition and are operated in a safe manner;

4.1.2 HSE Management

CONTRACTOR shall cover the HSE requirements & commitments to fulfil HSE MS. The CONTRACTOR shall obtain the approval of its site specific HSE Plan from Owner / Consultant prior to commencement of any site works. Corporate as well as Site management of the CONTRACTOR shall ensure compliance of their HSE Plan at work sites in its entirety in true spirit.

4.1.3 Indemnification

CONTRACTOR shall indemnify & hold harmless, Owner/Consultant & their representatives, free from any and all liabilities arising out of non-fulfilment of HSE requirements or its consequences.

4.1.4 Deployment & qualifications of HSE personnel

CONTRACTOR shall submit scrutinized CVs as per requirement prior to the job. Consultant HSE shall evaluate the CVs and conduct personal interview of the proposed candidates. Only Consultant approved CONTRACTOR HSE personnel are permitted to work at site. In case of replacement of approved CONTRACTOR HSE Personnel, the CONTRACTOR shall plan in advance and follow the above procedure.

The CONTRACTOR shall designate/deploy various categories of HSE personnel at site as indicated below in sufficient number. i.e. deployment of safety officer/Safety Engineer is compulsory at project site.

Employee strength (Including CONTRACTOR)	Minimum Strength of HSE personal required
Up to 50	HSE Officer/ HSE Engineer & Male Nurse
51 to 150	HSE Officer / HSE Engineer (1 for every 50 workers) + 01 Male nurse
Above 150	1 HSE Manager + HSE Officer/ HSE Engineer for every 50 workers + 01 Male Nurse

The minimum standard for CONTRACTOR HSE personnel should be:

HSE Manager

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Should be Technical graduate engineers (Chemical / Mechanical / Electrical / Civil) with 10 years' experience and above as supervisor in Oil & Gas / Refinery / Petrochemicals or Bulk Chemical Manufacturing companies or Large Construction sector. He / she must be able to communicate, write and read English.

And Degree or Diploma in Industrial Safety with one subject of construction safety from a recognized Institute (Institute recognized by AICTE / State council of technical education for India) or from RLI.

HSE Officer

Should be a Science Graduate (Chemistry / Physics / Mathematics) with 5 years' experience and above as supervisor in Oil & Gas / Refinery / Petrochemicals or Bulk Chemical Manufacturing companies or Large Construction sector. He / she must be able to communicate, write and read English.

And Degree or Diploma in Industrial Safety with one subject of construction safety from a recognized Institute (Institute recognized by AICTE / State council of technical education for India) or from RLI.

HSE Engineer

Should be a graduate Engineer (Chemical / Mechanical / Electrical / Civil) or a Science Graduate from a recognized university with 5 years' experience and above as supervisor / safety in-charge in Oil & Gas / Refinery / Petrochemical / Bulk Chemicals Industry / large construction sector.

And Degree or Diploma in Industrial Safety with one subject of construction safety from a recognized Institute (Institute recognized by AICTE for India). He / she must possess site safety leadership attributes.

4.1.5 Implementation, Inspection / Monitoring

The CONTRACTOR shall be fully responsible for planning, reporting, implementing and monitoring of HSE requirements and compliance of laws & statutory requirements. The CONTRACTOR shall also ensure that the HSE requirements are clearly understood & implemented conscientiously by their site personnel at all levels at site. The CONTRACTOR shall ensure physical presence of their field

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engineers / supervisors, during the continuation of their contract works / site activities including all material transportation activities.

Physical absence of experienced field engineers / supervisors of CONTRACTOR at critical work spot during the course of work, may invite severe penalization as per the discretion of EIC, including halting / stoppage of work. CONTRACTOR shall furnish their annual Inspection Plan, in line with project issues /subjects, frequency and performers to Owner / Consultant.

The CONTRACTOR shall regularly review inspection report internally and implement all practical steps / actions for improving the status continuously. The CONTRACTOR shall ensure important safety checks right from beginning of works at every work site locations and to this effect "Daily Safety Check List" shall be prepared by field engineer & duly checked by safety personnel for conformance.

Adequate records for all inspections shall be maintained by the CONTRACTOR and the same shall be furnished to Owner / Consultant, whenever sought. The CONTRACTOR shall not carry-out work by engaging single worker anywhere without any supervisor anytime during day or night.

To demonstrate involvement/commitment of site management of CONTRACTOR, at least one Safety Walk through shall be carried out by CONTRACTOR's head of site (along with his area manager/field engineers) and a report shall be furnished to Owner/Consultant "Safety walk through report as Appendix – 12 " followed by compliance for unsatisfactory remarks.

As a general practice lifting tools/tackles, machinery, accessories etc. shall be inspected, tested and examined by competent people (approved by concerned State authorities) before being used at site and also at periodical interval (e.g. during replacement, extension, modification, elongation/reduction of machine/parts, etc.) as per relevant statutes.

Hydra, cranes, lifting machinery, mobile equipment / machinery / vehicles(as Appendix in 14), etc. shall be inspected regularly by only competent / experienced personnel at site and requisite records for such inspections shall be maintained by every CONTRACTOR.

CONTRACTOR shall also maintain records of maintenance of all other site machinery (e.g. generators, rectifiers, compressors, cutters, etc.) & portable tools / equipment being used at project related works (e.g. drills, abrasive wheels, punches, chisels, spanners, etc.). The CONTRACTOR shall not make use of arbitrarily fabricated 'derricks' at project site for lifting / lowering of construction materials.

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All sites facilities and working condition should be periodically inspected by CONTRACTOR and records are to be maintained.

4.1.6 Behavior Based Safety

The CONTRACTOR shall develop a system to implement Behaviour-Based Safety (BBS) through which work groups can identify, measure and change the behaviours of employees and workers.

The BBS process shall include the following:

- Identify the behaviors critical to obtaining required safety performance.
- Communicate the behaviors and how they are performed correctly to all
- Observe the work force and record safe/at risk behaviors. Intervene with workers to give positive reinforcement when safe behaviors are observed. Provide coaching/correction when at risk behaviors are observed
- Collect and record observation data
- Summarize and analyze observation data
- Communicate observation data and analysis results to all employees
- Provide recognition or celebrate when safe behavior improvements occur
- Change behaviors to be observed or change activators or change consequences as appropriate.
- Communicate any changes to workforce

CONTRACTOR through its own HSE committee shall implement the above process. The necessary procedures and reporting formats shall be developed by the CONTRACTOR for approval by Owner/Consultant.

CONTRACTOR shall observe individual's behaviour for safe practices adapted for utilization/execution of work for the following as a minimum:-

- PPE
- Tools & equipment
- Hazard Identification & control
- House keeping
- Confined space entry

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- Hot works
- Excavation
- Loading & unloading
- Work At height
- Stacking & storage
- Ergonomics
- Procedures

4.1.7 Awareness and Motivation

The CONTRACTOR shall promote and develop awareness on Health, Safety and Environment protection among all personnel working for the CONTRACTOR. Regular awareness programs and fabrication shop / work site meetings at least on monthly basis shall be arranged on HSE activities to cover hazards/risks involved in various operations during construction. CONTRACTOR to motivate & encourage the workmen & supervisory staff by issuing / awarding them with tokens/ gifts/ mementos/ monetary incentives / certificates, etc. CONTRACTOR shall assess & recognize the behavioural change of its site engineers / supervisors periodically and constantly motivate / encourage them to implement HSE practices at project works

4.1.8 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. The CONTRACTOR shall try to achieve a statistically fair record and strive for its continual improvement.

Leading Indicators viz:-:

- Number of Safety Inductions carried-out at site (for workmen & staff members)
- Number of HSE inspections carried out
- Number of “Safety Walk Through” carried-out by site-head.
- Number of HSE shortfalls / lapses identified per CONTRACTOR & closed-out in time.
- Number of Safety Meetings conducted (in-house / with CONTRACTORS)
- Numbers of HSE Audits made (Internal & External) vis-à-vis non Conformance raised

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- Number of HSE Awareness / Motivational program conducted by CONTRACTORS
- Number of HSE Trainings conducted at site for supervisors & workmen
- Study of Near miss case reported
- Encouragements / Awards / Recognitions to workmen, job supervisors & field engineers.
- Suggestions for improvement

Trailing Indicators viz:- (Lagging)

- Calculation of HSE statistics viz frequency rate, severity rate, LTA free Manhours
- Analysis of incidents / accidents (nature, severity, types etc.)
- Study of Incident / Accident with respect to :- Variety , Period of the year / project span
- Timings of the incident / accident
- Age profile of victims and Body parts involved
- Penalty levied for causing incident / accident

4.1.9 Documentation

The CONTRACTOR shall evolve a comprehensive, planned and documented system covering the following as a minimum for implementation and monitoring of the HSE requirements and the same shall be submitted for approval by Owner/Consultant.

- HSE Organogram
- Site Specific HSE Plan
- Safety Procedures, forms and Checklist. Indicative list of HSE procedures
- Risk Assessment & Job Safety Analysis for critical works as format attached.

The monitoring for implementation shall be done by regular inspections and compliance of 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 Owner/Consultant shall not absolve CONTRACTOR of his responsibility/liability in relation to fulfilling all HSE requirements.

4.1.10 HSE Audit

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The CONTRACTOR shall submit an Audit plan to Consultant indicating the type of audits. Project Manager / RCM holds the ultimate responsibility in ensuring implementation of HSE audit program during the construction work.

4.1.10.1 Internal HSE Audit

The CONTRACTOR shall conduct an internal HSE audit on quarterly basis and submit a report to Owner / Consultant. Internal HSE audits are to be conducted by Qualified HSE Internal Auditors with the prior approval of the Consultant.

4.1.10.2 External HSE Audit

External HSE audits are to be conducted by external agencies that are competent with ISO qualified auditors with the prior approval of the Owner / Consultant.

4.1.10.3 Areas of competence of Audit team

Audit shall be conducted as per the guidelines of ISO, ILO, OISD. External HSE audit shall be conducted requirement basis throughout the period of the contract. The coverage of the external audit shall include the following items but not limited to:

i) HSE Management :

- Organization
- Communication and Motivation
- Inspection
- Emergency preparedness
- Education and Training
- Work permit system First-aid and Medical Facilities
- Welfare measures
- Environmental Management

ii) Technical:

- Building and Structure

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- Construction operational safety
- Material safety
- Hand tools and Power tools
- Electrical system
- Safety Appliances
- Fire prevention and control
- Housekeeping & Maintenance and Machinery safety
- Scaffolding etc.

iii) Audit Documents:

CONTRACTOR shall make the listed documents available for the review at the time.

- HSE policy & HSE manual
- HSE Rules and Regulation
- HSE organization chart
- Annual HSE objectives / programs
- Incident / near miss statistics and analysis
- HSE Training program / records for all personnel
- Operating manuals and maintenance manual of all equipment's
- Safe worthiness certificates of all lifting appliances and gears
- Medical fitness record for all personnel
- Risk identification, assessment and control details
- Environmental management reports
- Emergency management records including mock drill & Reporting:

iv) Audit Findings:

All audit findings as detailed in the audit checklists shall be grouped together as priority 1 and 2 as detailed below in a separate listing.

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Priority 1: Actions to rectify gaps or weakness should generally be implemented within one-week time, if risk potential is high or unacceptable.

Priority 2: Actions should be generally implemented or rectified with a maximum of 4 weeks, if not rectified would create a likelihood of minor injury or business loss.

v) Conformity Report & Action:

The CONTRACTOR shall submit the Compliance report within 15 days of conducting initial audit for priority1 observations and within 04 weeks for priority observations to Consultant. In case of non-conformity of items mentioned by auditor, the Consultant shall take necessary steps including stoppage of work and or imposing any penalty for getting the item implemented. Failure of CONTRACTOR to conduct External / Internal HSE Audit. If the CONTRACTOR fails to conduct the external/ Internal HSE audit in time, the Consultant at the cost of CONTRACTOR shall get it done.

4.1.11 Meetings

The CONTRACTOR shall ensure participation of his top most executive at site (viz. Resident Construction Manager / Resident Engineer / Project Manager / Site-in-Charge) in Safety Committee / HSE Committee meetings arranged by Owner/ Consultant usually on monthly basis or as and when called for. In case CONTRACTOR's top most executive at site is not in a position to attend such meeting, he shall inform Owner/ Consultant in writing before the commencement of such meeting indicating reasons of his absence and nominate his representative – failure to do so may invite very stringent penalization against the specific CONTRACTOR, as deemed fit in Contract. The obligation of compliance of any observations during the meeting shall be always time bound. The CONTRACTOR shall always assist Owner/ Consultant to achieve the targets set by them on HSE management 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. Such internal HSE meetings shall essentially be attended by field engineers / supervisors (& not by safety personnel only) of the CONTRACTOR and its associates. Records of such internal HSE meetings shall be maintained by the CONTRACTOR for review by Owner/ Consultant or for any HSE Audits.

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Agenda of internal HSE meeting should broadly cover: -

- Confirmation of record notes / minutes of previous meeting
- Discussion on outstanding subjects of previous points / subjects, if any
- Incidents / Accidents (of all types) at project site, if any
- Current topics related to site activities / subjects of discussion
- House keeping
- Behavioral Safety
- Information / views / deliberations of members / site sub-CONTRACTORS
- Report from Owner / Consultant
- Status of Safety awareness, Induction programs & Training programs
- The time frame for such HSE meeting shall be religiously maintained by one and all.

For minutes of meeting Refer Appendix – 10

4.1.12 Laws and Regulations - National Regulations and Standards

CONTRACTOR shall comply and ensure compliance with the relevant applicable National regulations and any other Local regulation applicable throughout the performance of the Work as per Conditions of the Contract; and in particular the laws and regulations relating to:

- Health safeguarding
- Safety
- Respect for the Environment
- Fire safety
- Emergency situation prevention and preparedness

With regards to the Construction Site, CONTRACTOR shall comply with Local regulation applicable in the working site . Refer appendix - 2

5. OCCUPATIONAL HEALTH REQUIREMENTS

5.1 General

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The CONTRACTOR shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures. CONTRACTOR shall establish a format for Pre-employment medical examination for their employees and Subcontract workers in compliance with BOCW Act / Factories Act.

No female labour shall be employed in dark hours i.e. hours prohibited under the applicable law. (Ref.- Section 66(1) (b) of the Factories Act, 1948)

Pre-employment medical fitness criteria for the persons assigned to HSE sensitive job like confined space, radiation, crane and fork lift operators, vehicle drivers; and exposure to hazardous chemicals and noise should include specific medical tests / examination related to the these activities.

5.2 Occupational Hazards

To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium. Appropriate respiratory protective devices(hood with respiratory devices) shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes.

CONTRACTOR workers carrying slag blasting operation shall use slag blasting hood with vortex cooling system, airline supply and face shields, with respiratory protection. 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 equipment. 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 Work Related Upper Limb Disorders (WRULD) and backaches, Display Screen Equipment 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 blood circulation in hands.

5.3 Health Centre

The CONTRACTOR shall ensure at a construction site an occupational health centre, mobile or static is provided and maintained in good order.

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5.4 Ambulance

The CONTRACTOR shall ensure the availability of an ambulance at construction site for transportation of serious cases of Incident or sickness of workers to hospital promptly and such ambulance and room are maintained in good repair and is equipped with standard facilities.

5.5 Rest Room

The CONTRACTOR shall provide one latrine seat for every 20 workers up to 100 workers and thereafter one for every additional 50 workers. In addition one urinal accommodation shall be provided for every 100 workers.

When women are employed, Separate latrine and urinals accommodation shall be provided on the same scale and maintained and shall comply with the requirements of public health authorities.

5.6 Rest Shelters cum Lunch Room

CONTRACTOR shall provide Adequate rest shelter cum lunch room for the workers as a min. requirement of 45 m² / person. The rest shelter shall be well illuminated and ventilated by providing sufficient lights, fans & windows. The rest shelters shall have sufficient numbers of tables and chairs and drinking water facility etc.

5.7 Canteen

In every workplace wherein not less than 250 workers are ordinarily employed the CONTRACTOR shall provide an adequate canteen. Reasonable canteen facilities at site and in Labour camps at appropriate location depending upon site conditions. CONTRACTOR shall make use of “industrial” variety of LPG cylinder & satisfactory illumination at the canteens.

Necessary arrangement for efficient disposal of wastes from canteens & urinals /toilets shall also be made and regular review shall be made to maintain the ambience satisfactorily hygienic & shall also comply with all applicable statutory requirements.

5.8 Drinking water

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The CONTRACTOR shall make in every worksite, effective arrangements to provide sufficient supply of wholesome drinking water with minimum quantity of 5 liters per workman per day. Quality of the drinking water shall conform to the requirements of national standards on Public Health (i.e IS10500). While locating these drinking water facilities due care shall be taken so that these are easily accessible within a distance of 200m from the place of work for all workers at all location of work sites. All such points shall be legible marked “Drinking Water” in a language understood by a majority of the workmen employed in such place and such point shall be situated within six meters of any washing places, urinals or latrines. CONTRACTOR shall submit Drinking water Test Report as per IS : 10500 every quarter to Owner / Consultant.

5.9 Labour Accommodation

The CONTRACTOR shall provide temporary living accommodation to all workers. These accommodations shall have cooking place, bathing, washing and lavatory facilities as per local legislation. Adequately ventilated / illuminated rooms at Labour camps & its hygienic up-keeping.

5.10 Welfare Measures

CONTRACTOR shall, at the minimum, ensure the following facilities at work sites:

A crèche at site where 30 or more female workers are having children below the age of 6 years. Adequately ventilated / illuminated rooms at labour camps & its hygienic up-keeping. Reasonable canteen facilities at site and in labour camps at appropriate location depending upon site conditions. CONTRACTOR shall make use of “industrial” variety of LPG cylinder & satisfactory illumination at the canteens. Necessary arrangement for efficient disposal of wastes from canteens & urinals /toilets shall also be made and regular review shall be made to maintain the ambience satisfactorily hygienic & shall also comply with all applicable statutory requirements. Adequately lighted & ventilated Rest rooms at site (separate for male workers and female workers). Urinals, Toilets, drinking water, washing facilities, adequate lighting at site and labour camps, commensurate with applicable Laws / Legislation.

5.11 First-Aid

The CONTRACTOR shall arrange suitable First-aid measures such as First Aid Box, trained personnel/nurse (male) to administer First Aid, stand-by Ambulance vehicle and shall arrange

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installation of fire protection measures such as adequate number of steel buckets with sand & water and adequate number of appropriate portable fire extinguishers to the satisfaction of Owner/ Consultant. The CONTRACTOR shall deploy trained supervisory personnel / field engineers to cater to any emergency situation. Spraying chemicals / repellent at site shall be made available to prevent Snakes. Anti-venom shall be kept in First Aid box. List of details of First Aid Box refer Appendix – 1

CONTRACTOR medical department shall have an ongoing first-aid training program for their staff. CONTRACTORS are responsible for ensuring first-aid training for their staff. Training shall be structured and based on international standard. At least 1 person out of 50 will follow the first-aid basic training course. All safety staff shall be trained. All the first-Aiders will be identified by a sticker.

The CONTRACTOR shall ensure at a construction site one First-aid box for 100 workers provided and maintained for providing First-aid to the workers. Every First-aid box is distinctly marked “First-aid” and is well equipped.

CONTRACTOR will ensure for availability of adequate number of qualified first aider available at site. Number of first aiders will depend on type and size of work. Minimum one first aider should be available in a group of workers engaged in a specific task. For this, the CONTRACTOR will ensure that a suitable number of personnel receive formal first aid training from a recognized agency. Before deploying the workforce this should happen and refresher training of the same also need to be taken care.

5.12 Prevention of mosquito breeding

CONTRACTOR shall take measures to prevent mosquito breeding at site. The measures to be taken shall include:

- Empty cans, oil drums, packing and other receptacles, which may retain water shall be deposited at a central collection point and shall be removed from the site regularly.
- Still waters shall be treated at least once every week with oil in order to prevent mosquito breeding.
- CONTRACTOR'S equipment and other items on the site, which may retain water, shall be stored, covered or treated in such a manner that water could not be retained.

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- Posters in both Hindi and English or local Languages, which draw attention to the dangers of permitting mosquito breeding, shall be displayed prominently on the site.
- The CONTRACTOR at periodic interval shall arrange to prevent mosquito breeding by fumigation / spraying of insecticides. Most effective insecticides shall include SOLFAC WP 10 or Baytex, The Ideal Larvicide etc.
- Spraying of chemicals shall be done to keep away mosquitoes and to kill its larvae. Ensure availability of proper medical care for the infected victim. Medical Awareness shall be created among site personnel regarding Malaria.

5.13 Noise

The CONTRACTOR shall consider noise as an environmental constraint in his design, planning and execution of the Works and provide demonstrable evidence of the same. The CONTRACTOR shall, take all appropriate measures to ensure that work carried out by the CONTRACTOR, whether on or off the Site, will not cause any unnecessary or excessive noise which may disturb the occupants of any nearby dwellings, premises with similar sensitivity to noise.

The CONTRACTOR shall ensure that all powered mechanical equipment used in the Works shall be effectively sound reduced using the most modern techniques available including but not limited to silencers and mufflers. Noise level shall be as prescribed by standards. The CONTRACTOR shall construct acoustic screens or enclosures around any parts of the Works from which excessive noise may be generated. The same may be varied from time to time by and at the sole discretion of the Consultant, In the event of a breach of this requirement, the CONTRACTOR shall immediately re-deploy or adjust the relevant equipment or take other appropriate measures to reduce the noise levels and thereafter maintain them at levels which do not exceed the said limits. Such measures may include without limitation the temporary or permanent cessation of use of certain items of equipment.

5.13.1 Noise Control Requirements

Construction material should be operated and transported in such a manner as not to create unnecessary noise as outlined below:

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Perform Work within the procedures outlined herein and comply with applicable codes, regulations, and standards established by the Central and State Government and their agencies.

Keep noise to the lowest reasonably practicable level. Appropriate measures will be taken to ensure that construction works will not cause any unnecessary or excessive noise, which may disturb the occupants of any nearby dwellings, premises with similar sensitivity to noise.

Use equipment with effective noise-suppression devices and employ other noise control measures.

5.14 Ventilation and Illumination

5.14.1 Ventilation

The CONTRACTOR shall ensure at a construction site of a building or other construction work or confined areas that all working areas are provided with ventilation system as approved by the Consultant and the fresh air supply in such areas is not less than 6 m³ / min for each worker working in such areas and the free air flow movement inside such tunnel is not less than 9 m / min.

The oxygen level shall not be less than 19.5% in the working environment.

5.15 Illumination

The CONTRACTOR shall take every effort to illuminate the work site. The CONTRACTOR shall conduct a monthly illumination monitoring by Lux meter for all the locations and the report shall be sent to the Consultant on periodical basis as planned and the same shall be reviewed during the monthly HSE committee meeting. The minimum illumination for the work area will be 250 lux.

5.16 Radiation

The use of radioactive substances and radiating apparatus shall comply with the Govt. regulatory requirements and all subsidiary legislation. Operations involving ionizing radiation shall only be carried out after having been reviewed without objection by the Consultant representative and shall be carried out in accordance with a method statement. Each area containing irradiated apparatus shall have warning notices and barriers, as required by the Regulations, conspicuously posted at or near the area. Radioactive substances will be stored, used or disposed shall be strictly in accordance with the Govt.

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Enactments. The CONTRACTOR shall ensure that all site personnel and members of the public are not exposed to radiation. Periodical medical check have to be carried out as stipulated in the HSE Plan.

5.17 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. The CONTRACTOR shall not allow any workman to commence any work at any locations of project activity who is/are influenced / effected with the intake of alcohol, drugs or any other intoxicating items being consumed prior to start of work or working day.

Awareness about local laws on this issue shall form part of the Induction Training and compulsory work-site discipline.

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 as well as intoxicating drugs, dry tobacco powder, etc. shall not be allowed inside the project / plant complex.

Smoking not at all allowed in the vicinity of workplace.

6. SAFETY REQUIREMENTS

6.1 Site preparation & development

Good Housekeeping shall be maintained during site preparation and development work

Water Sprinkling shall be done to control dust. While storing, soil or other fine particles material shall be stored in low height of the heap. Cover them with empty gunny bags to prevent dust particle flying. Vegetation clearing shall be carried out on a needs basis.

6.2 Site Labour Camp / Colony

- Proper 1.8m wire net fence with barbed-wire or wall shall be provided around camp. 24 hours Security Guards shall be deployed at camp. Security cameras to be provided all places wherever required including all site gates.
- Living facilities are built with masonry materials or porta cabins. Approximate area of 45 m²

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per person to be provided within each accommodation units.

- All occupants to be provided with a comfortable mattress, pillow, cover and clean bedding.
- Adequate space for hanging, drying, and airing clothes to be provided.
- Provide adequate nos. of latrines, bathrooms & urinals in ratio 1:25 employees..
- Separate accommodation, bathrooms, urinals & latrines to be provided for males
- & females, where both male & female employees are employed.
- For food preparation/cooking separate common kitchen with proper platforms to be provided which can be used for food cooking by occupants. In case if food cooking done inside accommodation, then proper platform to be provided for cooking purpose & gas cylinder connection and also partition to keep safe distance from occupants sleeping / resting space.
- Only authorized Commercial LPG gas connection to be used for food cooking. Gas stove, gas hoses and regulator in use shall have ISI marks. Gas stove, gas hoses and regulators shall be periodically inspected maintaining record. Wood burning is prohibited in camp.
- LPG gas cylinders to be stored in well ventilated area. Cylinder Storage area to be shielded from direct sunlight or any heat/ignition source. Cylinder to be stored vertically separated and marked "Empty" or "Full". Provide fire extinguishers for gas cylinder storage and kitchen.
- Ensure Liquefied petroleum (LPG) gas total quantity of gas in storage does not exceed 100 kg at a time for own use.
- Provide LPG detectors in kitchen/ cooking area and LPG storages.
- Provide LPG gas stoves, gas hoses and gas regulators complying with relevant Indian standards.
- Adequate quantity of drinking and washing water provided. Drinking water quality to be regularly monitored and tested periodically as per IS 10500. Drinking water tanks to be cleaned periodically. Maintain area around drinking water tanks in hygienic condition.
- Proper roads & walkways/ passages shall be provided in camp area with illumination.
- Adequate nos. of two types of Bins (Green & Blue) with lids shall be provided for storage and segregation of solid waste as biodegradable (Wet waste) and non-biodegradable (Dry waste).
- Rooms, Latrines, bathroom, urinals and surrounding area to be maintained in a clean and sanitary condition cleaning twice per day.
- Walls, ceilings, and partitions of every latrine / urinal white washed or colour washed once in

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every period of four months.

- Smoking is strictly prohibited inside the accommodations, kitchen, recreation rooms, in vicinity of LPG storage area. Designated smoking areas to be provided with fire extinguishers.
- All Electrical panels shall be provided with 30 mA rating ELCB.s. Provide fire extinguishers for electrical panels.
- Pest control to be done periodically. Handling of pesticides is done by trained personnel with suitable PPE. Pesticides and related chemicals are stored in a dedicated well-ventilated storage room displaying MSDS.
- Sewage Treatment Plant (STP) to be set up with in the camp area for treatment of sewage & waste water and disposed such that it does not present a hazard to health and environment. Six monthly environmental monitoring of influent sewage water and effluent sewage water of STP shall be carried out through MOEF approved agency.
- All waste water, sewage, food waste and any other waste material are disposed as per Environment Protection Act/Rules & respective Waste Management Rules.
- Separate first aid facility with male nurse to be provided for camp in case site first aid center is not within the reach.
- Sufficient nos. of First Aid Boxes shall be provided at adequate locations. First aid facility & first aid boxes shall be inspected monthly by male nurse.
- Doctor consultation shall be made available on Every Sunday at Camp.
- Adequate and appropriate type of Fire Fighting Equipment to be installed in camp and checked regularly and maintained to use readily.
- Assembly points to be designated. Emergency Telephone Contact numbers to be displayed at prominent location in camp.
- Adequate emergency lights are installed in kitchen and evacuation routes.
- Sufficient number of camp occupants to be trained on basic firefighting, fire warden and first aid,
- Indoor /outdoor recreational facilities to be provided for camp occupants.
- CONTRACTOR (s) shall depute camp supervisor and also persons for carrying daily housekeeping, maintenance work etc.
- Camp office / sitting arrangement for camp Supervisors. Weekly/monthly camp inspection

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shall be done by camp supervisor.

- Food handlers of camp undergo pre-employment and periodic medical exams for any infectious, contagious and other communicable diseases

6.3 Signs and Tags

Fire prevention warning signs shall be displayed at the site. The fire prevention signs shall include the following:

- Action to be taken in the “event of a fire” signs shall be displayed in all offices.
- Information signs for the use of fire extinguishers to be displayed.
- Fire equipment layout signs shall be displayed.

CONTRACTOR (s) shall display safety signs, signals and banners as minimum but not limited to:

- Personnel Protective Equipment Requirements
- Road Closure warning
- Excavation warning
- Caution Men Working Above
- No Smoking
- No Cameras/Photography
- Site Speed Limit
- Housekeeping
- Lifting in Progress
- Hearing Protection
- Confined Space Working
- Fall Protection Required
- Electrical Hazard
- Potential for Slip, Trip, Fall
- Radiation warning
- Danger – Hot Surface
- Traffic safety / warning signage

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- High noise zone / area
- Other signage required as per JSA/TRA or as per the site specific conditions.
- Emergency warning signs shall be displayed at the site.
- Emergency escape route signs at the site and in all offices shall be displayed
- Emergency assembly point locations shall be identified and sign posted
- The Site Medical Facility shall be clearly identified.
- Emergency control center shall be clearly identified.
- Emergency telephone contact numbers shall be displayed.

A scaffold tagging system (color coded) is to be employed at the site. Safety signs shall be prominently displayed on all scaffolds erected at the site indicating "RED" tag to indicate "Do not use" and "GREEN" tag to indicate "safe for use".

6.4 House Keeping

The CONTRACTOR shall ensure that housekeeping is maintained and shall follow

- a) All surplus earth and debris are removed/disposed of 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 identify 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.

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- 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 – same arrangement is preferable for digging pits / trench excavation / elevated work platforms / confined spaces etc.
- l) Welding cables and the power cable must be segregated and properly stored and used the same shall be laid away from the area of movement and shall be free from obstruction.
- m) Schedule for upkeep/cleaning of site to be firmed up and implemented on regular basis

The CONTRACTOR shall carry-out regular checks (minimum one per fortnight) for maintaining high standard of housekeeping and maintain records for the same.

6.5 Fire prevention

The CONTRACTOR shall arrange FIRE DRILL at each site at least once in three months, involving site workmen and site supervisory personnel & engineers. The CONTRACTOR shall maintain adequate record of such fire drills at project site.

6.6 Personal Protective Equipment (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. The CONTRACTOR shall implement a regular regime of inspecting physical conditions of the PPEs being issued / used by the workmen of their own & also its sub-agencies and the damaged / unserviceable PPEs shall be replaced forthwith.

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For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory. Such protective clothing should conform relevant IS Specification.

The CONTRACTOR shall provide required PPEs to workmen to protect against safety and / or health hazards. Primarily PPEs shall be as per the applicable standard given below.

S.No.	PPE	Applicable standard
1	Head Protection* (Safety helmets)	EN 397, IS:2925:1984, OSHA 1926.135, ANSI Z89.1/89.2, AS 1808, BS 5240, DIN 4840
2	Foot Protection* (Safety footwear, Gumboot, etc.)	ASTM F-2412-2005, EN ISO 20345, ANSI Z 41.1, AS 2210, EN 345
3	Body Protection* (High visibility clothing (reflective jacket / coverall), Apron, etc.)	EN 13034, EN 13034, BS EN 471: 1994.
4	Personal fall protection (Full body harness, Rope-grap fall arrester, etc.)	EN 361, EN 354, EN 355, EN 353-1, EN 353-2, EN 360
5	Eye Protection* (Goggles, Welders glasses, etc.)	EN166, EN 169, ANSI Z87.1, ANSI ZZ87.1, AS1337, BS 2092, BS 1542, BS 679, DIN 4646/58311,
6	Hand Protection* (Gloves, Finger coats, etc.)	EN 388, EN 420, EN 407, EN 374-3, BS 1651
7	Respiratory Protection. (Nose Mask, SCBAs, etc.)	EN 133, EN 149, EN 405, EN 140, EN 141
8	Hearing Protection (Ear plugs, Ear muffs, etc.)	EN 352-2, EN 458, BS 6344, ANSI S 31.9

The wearing of short pants or skirts and of sleeveless shirts shall not be allowed even for office activities. As well, loose or torn clothing and sandals are prohibited. Facial hair must be worn short so as not to hinder the wearing of PPE.

Color coding for helmets*

Categories	Color of Helmet
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Staff	White
Safety Personnel	Green
Workers	Yellow
Electrician	Red
Visitors	White

* Color coding of helmets are subjected to change as per Owner / Consultant requirements.

CONTRACTOR shall ensure procurement & usage of following safety equipment / accessories (conforming to applicable IS Mark / CE standard) by their staff, workmen & visitors in all stages of operations.

CONTRACTOR shall ensure procurement & usage of following safety equipment/ accessories (conforming to applicable IS mark / CE standard) by their staff, workmen & visitors in all stages of operations through the span of project construction / pre-commissioning/ Commissioning.

- PPEs (Helmet, Spectacle, Ear-muff, Face shield, Hand gloves, Safety Shoes, Gum boot)
- Barricading tape / warning signs
- Rechargeable Safety torch (flame-proof)
- Safety nets (with tie-chords)
- Fall arresters
- Portable ladders (varying lengths)
- Life-lines (steel wire-rope, dia not less than 8.0 mm)
- Full body harness (double lanyard)
- Lanyard
- Karabiner
- Retractable fall arresters (various length)
- Portable fire extinguishers (DCP type) – 5 kg capacity

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- Portable Multi Gas detector
- Sound level meter
- Digital Lux meter
- Fire hoses & flow nozzles
- Fire blankets / Fire retardant cloth (with eyelets)

Please refer ANNEXURE for the details of “ **Guidelines on Personal Protective Equipment (PPE)**”

6.7 Working at Height

The CONTRACTOR shall arrange and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing/descending tall structures or vessels / columns etc. 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. Working at a height, where the person has the potential of free fall of more than 1.8 meters or 6 feet, work permit should be received before commencement of the job as per Work Permit procedure.

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

The 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 up to sufficient margin to arrest fall of persons working at different heights.

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In case of accidental fall of person on such Safety Net, the bottom most portion of Safety Net should not touch any structure, object or ground.

The 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 be sufficiently strong & shall have sufficient space to hold the workmen and tools & tackles including the equipment required for executing the job. Such working platforms shall have mid-rails, to enable people work safely in sitting posture.

6.8 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 or certified (by 3rd party competent person) man-basket. When a ladder is used, an extra workman shall always be engaged for holding the ladder. All scaffolding at the site shall be erected and maintained in accordance with applicable Indian codes of practice viz. IS: 3696, IS: 4014-1967, IS: 1161, IS: 2750 or other equivalent international standards.

The CONTRACTOR shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Main CONTRACTOR shall always furnish duly approved construction-design details of scaffold & SWL (from competent designers) free of charge, before they are being installed / constructed at site. Owner/ Consultant reserves the right to ask the CONTRACTOR to submit certification and or design calculations from his Head office / Design/ Engineering expert regarding load carrying capacity of the scaffoldings.

All scaffolds shall be inspected by a competent Scaffolding Inspector of the CONTRACTOR. He shall paste a GREEN tag (duly signed by competent Scaffolding Inspector) on each scaffold found safe and a RED tag (duly signed by competent Scaffolding Inspector) on each scaffold found unsafe. Scaffolds with GREEN tag only shall be permitted to be used and Scaffolds with RED ones shall immediately be made inaccessible. Work being found continuing on scaffolds with RED tag shall be considered unauthorized work by CONTRACTOR and may invite penalization from Owner/ Consultant.

For every 120-125 m² / m³ area / volume or its parts thereof minimum one TAG shall be provided.

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The CONTRACTOR shall ensure positive barricading (indicative as well as protective) 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.

Scaffolding shall be constructed using foot seals or base plates only (Appendix – 23)

6.9 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/ Consultant 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 arrange non-sparking tools for project construction works in operating plant areas / hydrocarbon prone areas. Wherever required the CONTRACTOR shall make use of Elevated Work Platforms (EWP) or Aerial Work Platforms (mobile or stationary) to avoid ergonomically risks and workmen shall be debarred to board such elevated platform during the course of their shifting / transportation.

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 equipment mobilized and used by him at the workplace like transport vehicles, engines, cranes, mobile ladders, scaffoldings, work tools, etc.

The CONTRACTOR shall arrange periodical training for the operators of hydra, crane, excavator, mobile machinery, etc. at site by utilizing services from renowned manufacturers.

6.10 Hazardous substances

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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. Respective MSDS (Material Safety Data Sheet) shall be made available at site & may be referred whenever problem arises.

Where contact or exposure of hazardous materials are likely to exceed the specified limit or otherwise have harmful effects, appropriate personal protective equipment such as gloves, goggles/face-shields, 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 Owner / Consultant.

6.11 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.

6.12 Barriers

Physical (hard) barriers shall be erected by CONTRACTOR (s) to provide protection against hazards and dangers, hazardous work areas and hazardous work in all cases where the hazard or danger will exist for a period longer than 72 hours.

Appropriate barriers must be provided in hazardous situations and during work presenting hazards. This is to be done in conformity with the table below and each CONTRACTOR shall provide enough barriers for their own activities:

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Situation	Barrier
Plant out of service	Crush barriers or continuous fencing
Open grated flooring, pit or gutter	Uprights and horizontals (hard barricades)
Acid/caustic treatment of equipment High pressure bead or grit blasting Welding, grinding, lifting, scaffold erection/ disassembly Activities in pipe racks	Red and white tape combined with pictogram signs
High pressure jetting Work with X-rays	Yellow and black barrier tape combined with pictogram signs
Hoisting operations	Special red and white barrier tape with printed inscription
Storage areas	Delimited by hard barriers (temporary=red and white chain combined with pictogram signs)
(Demolition) work involving asbestos-containing products	Yellow/black barrier tape or chain and warning notice

6.13 Work Permit System

The CONTRACTOR shall develop a Work Permit system, which is a formal written system used to control certain types of work that are potentially hazardous. A work permit is a document, which

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specifies the work to be done, and the precautions to be taken. Work Permits form an essential part of safe systems of work for many construction activities. They allow work to start only after safe procedures have been defined and they provide a clear record that all foreseeable hazards have been considered. Permits to Work are usually required in high-risk areas as identified by the Risk Assessments. Permit to Work format as Appendix in 18.

The CONTRACTOR shall issue Permit To Work (PTW) at height after verifying and certifying the checkpoints as specified in the attached permit. He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence of personal protective equipment. CONTRACTOR's Safety Officer shall verify compliance status of the items of permit document after implementation of action is completed by CONTRACTOR's execution / field engineers at work site. Job Safety Analysis (JSA) for specific works at height shall be kept attached with particular Permit To Work (PTW) at site for ready reference & follow-up.

Such PFW shall be initially issued for one single shift or expected duration of normal work and extended further for balance duration, if required. Owner/ Consultant can devise block-permit system at any specific area, in consultation with project specific HSE Committee to specify the time-period of validity of such PFW or its renewal. Owner/ Consultant field Engineers/Safety Officers/Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.

All personnel shall be medically examined & certified by registered doctor, confirming their 'medical fitness for working at height. The fitness examination shall be done once in six months.

In case work is undertaken without taking sufficient precautions as given in the permit, Owner/ Consultant Engineers may exercise their authority to cancel such permit and stop the work till satisfactory compliance/rectification is arranged made. CONTRACTORS are expected to maintain a register for issuance of permit and extensions thereof including preserving the used permits for verification during audits etc.

A permit is needed when construction work can only be carried out if normal safeguards are dropped or when new hazards are introduced by the work. Examples of high-risk activities include but are not limited to:

- Entry into confined spaces

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- Work in close proximity to overhead power lines and telecommunication cables.
- Hot work.
- To dig—where underground services may be located.
- Work with heavy moving machinery.
- Working on electrical equipment
- Work with radioactive isotopes.
- Heavy lifting operations and lifting operations closer to live power line.
- Removal of Grating. (Conditions of Contract on HS & E)

The permit-to-work system should be fully documented, laying down:

- How the system works;
- The jobs it is to be used for;
- The responsibilities and training of those involved; and how to check its operation.

A Work Permit authorization form shall be completed with the maximum duration period not exceeding 12 hours. Copy of each Permit to Work shall be displayed, during its validity, in a conspicuous location in close proximity to the actual works location to which it applies.

6.14 Batching Plant / Fabrication Yard / Casting Yard

The batching plant / casting yard shall be effectively planned for smooth flow of Unloading and stacking the aggregates reinforcements and cement, batching plant, transport of concrete, casting the segment, stacking the segment and loading the segments to the trucks. As far as possible the conflicts should be avoided.

The batching plant / casting yard shall be barricaded and made as a compulsory PPE zone.

If in case of material unloading area is not maintainable as PPE zone, the same shall be segregated properly and made as a non-PPE zone with appropriate barricading. Electrical system shall also be suitably planned so that location of diesel generator, if any, location of DBs, routing of cables and positioning of area lighting poles/masts does not infringe on any other utility and pose danger.

Drainage shall be effectively provided and waste water shall be disposed after proper treatment.

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Time office, canteen, drinking water, toilet and rest place shall be suitably located for the easy access to workers. All the facilities shall be properly cleaned and maintained during the entire period of operation. Manual handling of cement shall be avoided to a larger extent. Whenever it is absolutely necessary the workmen shall be given full body protection, hand protection and respiratory protection as a basic measure of ensuring better health.

The PPEs provided to cement handling workmen shall conform to international standards. Access roads and internal circulation roads shall be well laid and maintained properly at all time. Non-adherence to any of the above provision shall be penalized as per relevant penalty clause.

6.15 Construction Hazards

The 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) /Risk Analysis specifically for high risk jobs / critical jobs like

- Working at height (+2.0 Mts height) for cold incl. color washing, painting, insulation & hot works.
- Work in confined space,
- Deep excavations & trench cutting (depth > 1.2 mts.)
- Operation & Maintenance of Batching Plant.
- Shuttering / concreting (in single or multiple pour) for columns, parapets & roofs.
- Erection & maintenance of Tower Crane.
- Erection of pipes (full length or fabricated) at height more than 2.0 Mts. height with
- Crane of 50T capacity.
- All lifts using 50T Crane plus mechanical pulling.
- All lifts using two cranes in unison (Tandem Lifting).
- Any lift exceeding 75% capacity of the lifting equipment (hydra, crane etc.).
- Laying of pipes (isolated or fabricated) in deep narrow trenches – manually or mechanically.
- Maintenance of crane / extension or reduction of crane-boom on roads or in yards.
- Hydrostatic test of pipes, vessels & columns and water-flushing.
- Radiography jobs (in-plant & open field)

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- Work in Live Electrical installations / circuits
- Handling of explosives & Blasting operations
- Demolishing / dismantling activities
- Welding / gas cutting jobs at height (+2.0 Mts.)
- Lifting / placing roof-girders at height (+2.0 Mts.)
- Lifting & laying of metallic / non-metallic sheet over roof/structures.
- Lifting of pipes, gratings, equipment / vessels at heights (+2.0 Mts) with & without using cranes
- Calibration of equipment, instruments and functional tests at yards / work-sites.
- Operability test of Pump, Motors (after coupling) & Compressors.
- Cold or Hot works inside Confined Space.
- Transportation & shifting of ODC consignments into project areas.
- Working in “charged/Live” elect. Panels
- Stress Relieving works (Electrically or by Gas-burners).
- Pneumatic Tests
- Card board blasting
- Chemical cleaning

The necessary HSE measures devised shall be put in to place, prior to start of an activity & also shall be maintained during the course of works, by the CONTRACTOR. Copies of such JSAs shall be kept available at work sites to enable all concerned carrying out checks / verification. (Appendix – 15). CONTRACTOR (s) shall submit HIRA Register to Consultant for approval, 15 days before implementing at site.

6.16 Accessibility

The CONTRACTOR shall provide safe means of access(in sufficient numbers) & efficient exit 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 Owner/ Consultant.

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The shall implement use of all measures including use of “life line”, “fall-arresters”, “retractable fall arresters” , “safety nets” etc. during the course of using all safe accesses & exits, so that in no case any individual remains at risk of slip & fall during their travel. The access to operating plant / project complex shall be strictly regulated. Any person or vehicle entering such complex shall undergo identification check, as per the procedures in force / requirement of Owner/ Consultant.

Accessibility to ‘confined space’ shall be governed by specific system / regulation, as established at project site

6.17 Road Safety

The CONTRACTOR shall ensure adequately planned road transport safety management system. The vehicles shall be fitted with reverse warning alarms & flashing lights / fog-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, including maintaining speed limit of 20 kmph or indicated by owner for all types of vehicles / mobile machinery. The maximum allowable speed shall be adhered to.

In case of an alert or emergency, the CONTRACTOR must arrange clearance of all the routes, roads, access. The CONTRACTOR shall deploy sufficient number of traffic controllers at project site routes / roads/ accesses, to alert reversing movement of vehicles & machinery as well as pedestrians.

Dumpers, Tippers, etc. shall not be allowed to carry workers within the plant area and also to & from the labor colony to & from project sites. Hydras shall only be allowed for handling the materials at fabrication/ storage yards and in no case shall be allowed to transport the materials over project / plant roads. The CONTRACTOR shall not deploy any such mobile machinery / equipment, which do not have competent operator and / or experienced banks-man / signal-man. Such machinery / equipment shall have effective limit-switches, reverse-alarm, front & rear-end lights etc. and shall be maintained in good working order.

The CONTRACTOR shall not carry-out maintenance of vehicles / mobile machinery occupying space on project / plant roads and shall always arrange close supervision for such works. For pipeline jobs, the CONTRACTOR shall submit a comprehensive plan covering transportation, loading / unloading of pipes, movement of side booms, movement of vehicles on the ROW, etc. CONTRACTOR's shall

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arrange /install visible road signs, diversion boards, caution boards, etc on project roads for safe movement of men and machinery.

6.18 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. For information to all, typical subjects that should be communicated are:

Inside the company (Top to down)

- Quality and HSE Policy contents
- HSE Objectives
- HSE Target – reached or missed
- Praises & Warnings to personnel for HSE Management
- Safety Walk Through Reports and safety defects / shortfalls (by management)
- HSE Audit results
- Revised Statutory Health & Safety provisions, if any
- H & S publicity
- Suggestions

Inside the Company (Bottom to up)

- Complaints
- Compliances on safety defects / shortfalls
- Suggestions
- Proposals for changes & improvements
- HSE Reports (including near-miss reports)

6.19 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. The CONTRACTOR

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shall make right assessment and take all necessary action for developing work areas to make them safe & suitable for crane operations or other vehicular movement before carrying out any project related activity / operation. CONTRACTOR shall take all necessary actions to make the surroundings of its site establishments (site office, stores, lay-down area etc.) work-worthy safe and secure.

6.20 Tool Box Talks (TBT)

CONTRACTOR shall conduct daily TBT with workers prior to start of work and shall maintain proper record of the meeting. A suggested format is attached. The TBT is to be conducted by the immediate supervisor of the workers. The CONTRACTOR shall conduct TBT before start of every morning or evening shift or night shift activities, for alerting the workers on specific hazards and their appropriate dos & don'ts. The CONTRACTOR shall provide sufficient rests to the site workmen and their foremen to avert fatigue & thereby endangering their lives during the course of site works.

6.21 Training & Induction Program

Initial induction of workers into Construction oriented activities and appraising them about the methodology of works and how to carry-out safely and the same should not be inter mixed with Tool Box Talks or HSE Training. In this regard careful action should be made & maintained for imparting HSE induction to every individual, irrespective of his task/designation/level of employment, whereas, HSE Training should be imparted to specific person/group of people who are to carry-out that specific task more than once – for example, Riggers must be trained for working at heights, welders must be trained for work in confined space, fitters/carpenters, mesons must be trained for work at heights, etc

CONTRACTOR shall conduct Safety induction program on HSE for all his workers and maintain records. The Gate Pass shall be issued only to those workers who successfully qualify the Safety induction program.

The CONTRACTOR shall brief the visitors about the HSE precautions which are required to be taken before their proceeding to site and make necessary arrangements to issue appropriate PPEs like Aprons, hard hats, ear-plugs, goggles & safety shoes etc., to his visitors. The CONTRACTOR shall always maintain relevant acknowledgement from visitor on providing him brief information on HSE actions.

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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: -

- Why safety should be considered during work - explanation
- Education about hazards and precautions required
- Employees' duties & responsibilities
- Emergency and evacuation plan
- HSE requirements during project activities
- Firefighting and First-Aid
- Use of PPEs
- Occupational health issues – dos & don'ts
- Local laws on intoxicating drinks, drugs, smoking in force
- Common environmental subjects – lighting, ventilation, vibration, smoke/fumes etc.
- Records of the training shall be kept and submitted to Owner / Consultant.

The CONTRACTOR shall make regular program for conducting Safety Training on various topics related to various activities & their safe-guarding utilizing experienced persons / outside agency / faculty. A program for Safety Training (indicative list as Appendix – 13) shall be furnished by the CONTRACTOR in its HSE Plan .

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/ Consultant

6.22 Self-Assessment and Enhancement

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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

6.23 HSE Promotion

The CONTRACTOR shall encourage his workforce to promote HSE efforts at workplace by way of organizing workshops/seminars/training Programs, 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 incentives / bonus for completing the job without any lost time accident.

6.24 Incident Reporting and Investigation

6.24.1 Reporting to Consultant

All Incidents and dangerous occurrences shall immediately be informed verbally to the Consultant. This will enable the Consultant to reach to the scene of Incident / dangerous occurrences to monitor assist any rescue work and / or start conducting the investigation process so that the evidences are not lost. Reports of all Incidents (fatal / injury) and dangerous occurrences shall also be sent within 24 hours as per format provided in the Consultant (Incident reporting format as Appendix in 11). No Incident / dangerous occurrences are exempted from reporting to the Consultant. Any willful delay in verbal and written reporting to the CONTRACTOR shall be penalized.

6.24.2 Accident Investigations

Investigations should be conducted in an open and positive atmosphere that encourages the witnesses to talk freely. The primary objective is to ascertain the facts with a view to prevent future and possibly more serious occurrences. Incidents and Dangerous Occurrences which result in death, serious injury or serious damage must be investigated by the CONTRACTOR immediately to find out the cause of the Incident / occurrence so that measures can be formulated to prevent any recurrence.

Near misses and minor Incidents should be investigated in detail by the CONTRACTOR as soon as possible as they are signals that there are inadequacies in the safety management system.

6.24.3 Procedure of incident investigation

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It is important after any Incident or dangerous occurrence that information relating to the incident is gathered in an organized way. The following steps shall be followed;

- Take photographs and make sketches
- Examine involved equipment, work piece & the environmental conditions
- Interview the injured, eye-witnesses and other involved parties
- Consult expert opinion where necessary & identify the specific CONTRACTOR involved.
- Having gathered information, it is then necessary to make an analysis of incident
- Establish the chain of events leading to the Incident.
- Find out at what stage the Incident took place

Consider all possible causes and the interaction of different factors that led up to the Incident, and identify the most probable cause. The cause of an Incident should never be classified as carelessness. The specific act or omission that caused the Incident must be identified.

- The next stage is to proceed with the follow-up action
- report on the findings and conclusions
- formulate preventive measures to avoid recurrence
- Consultant independent incident investigation.

All the HIPO (High Potential) Incidents / Near misses are subject to TOPSET investigation by Consultant. In case of fatal / dangerous occurrence the Consultant shall also conduct independent investigation. CONTRACTOR and his staff shall extend necessary co-operation and testify about the Incident. The CONTRACTOR shall take every effort to preserve the scene of Incident till the Consultant completes the investigation. All persons summoned by the Consultant in connection to witness recording shall obey the instructions without delay. Any willful suppression of information by any person shall be removed from the site immediately and / or punishable.

6.25 Confined Space Entry

The CONTRACTOR shall generate a work permit before entering a confined space. People, who are permitted to enter into confined space, must be medically examined & certified by registered doctor, confirming their 'medical fitness for working in confined space'. All necessary precautions mentioned

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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. Inside confined space works, only electrical facilities / installations of 24V shall be permitted. Contactor shall ensure usage of safe suitable arrangement of oxygen supply for individual workmen (during the course of work in confined space), if oxygen concentration is found to be less than 19.5% (v/v) there.

6.26 Lock Out and Tag Out (LOTO) for isolation of energy source

CONTRACTOR shall follow the LOTO/Isolation procedure of owner for all energy source isolations installed/under purview by /of owner i.e.. “Brown field” . For all the other energy source (not under purview of Owner/Consultant) i.e. “Green field” CONTRACTOR shall develop a system to ensure the isolation of equipment, pipelines, Vessel, electrical panels from the energy source covering following as minimum:-

- Identification of all energy source viz electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radiation and other forms of stored or kinetic energy.
- Establishing the energy isolation devices viz: manually operated electrical circuit breakers, disconnection switches, blind flanges, etc.
- Installation of Lock Out devices for preventing the inadvertent release of stored energy and Tag Out devices (“Danger”, “Do Not operate” or Do not Remove” tags) to indicate that testing, maintenance or servicing is underway and the device cannot be operated until the tag out device is removed.
- Lock Out and Tag out log book
- Permit for isolation and de-isolation of energy source
- Availability of competent persons like experienced operators at substations, pump house, units

CONTRACTOR shall ensure that all the sources are locked out and tagged properly before giving clearance to start the job. After the completion of job, CONTRACTOR shall ensure all tools and tackles are removed and nobody is present in the working area and signing on LOTO log book Only on confirmation of above the CONTRACTOR will remove their lock and tag from the isolation points and give instructions for energizing the same. Only the person carrying out the task shall himself carry the

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key for the lock in /Lock out. LOTO tags as in Appendix - 8

6.27 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. All temporary electrical installations / facilities shall be regularly checked by the licensed/competent electricians of the CONTRACTOR and appropriate records shall be maintained Inspection of temporary electrical booth/installation at project construction site". Such inspection records are to be made available to Owner/ Consultant, whenever asked for.

The CONTRACTOR shall meet the following requirements:

- Shall make Single Line Diagram (SLD) for providing connection to each equipment's & machinery and the same (duly approved by Owner/ Consultant) shall be pasted on the front face DBs (distribution boards) or JBs (Junction boxes) at every site.
- 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.
- 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 Owner/ Consultant for records.
Availability of at least one competent (ITI qualified) / licensed electrician (by State Elec. authorities) shall be ensured at site round the clock to attend to the normal/emergency jobs.
- All switchboards / welding machines shall be kept in well-ventilated & covered shed/ with rain

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shed protection. The shed shall be elevated from the existing ground level to avoid water logging inside the shed . Installation of electrical switch board must be done taking care of the prevention of shock and safety of machine.

- 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.
- Fire extinguishers and insulating mats shall be provided in all power distribution centers.
- Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.
- Proper housekeeping shall be done around the electrical installations.
- All temporary installations shall be tested before energizing, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.
- All welders shall use hand gloves irrespective of holder voltage.
- Multilingual 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.
- 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.
- Test meter shall be used for testing ELCBs
- Regular inspection of all installations at least once in a month.
- The following features shall also be ensured for all electrical installations during construction phase by the CONTRACTOR:
- 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 armored cable.
- 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.

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

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shall be strictly prohibited. The earth leakage device shall have an operating current not exceeding 30 mA. All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.

All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps. Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm² copper shall be used for all single phase hand tools.

Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used. All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multi-strand wires / cables.

Cables shall be free from any insulation damage. 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 at least 2.1 M high. Minimum head clearance of 6 meters shall be provided at road crossings.

Underground road crossings for cables shall be avoided to the extent feasible. In any case no underground power cable shall be allowed to cross the roads without pipe sleeve. All cable joints shall be done with proper jointing kit. No taped/ temporary joints shall be used.

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 armor shall be bonded to the earthing system. All cables and wire rope used for earth connections shall be terminated through tinned copper lugs.

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.

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Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case. ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

6.28 Static Electricity Control

All necessary grounding and/or bonding precautions shall be taken to prevent the generation of static electricity in areas where this may cause hazard or fire such as, motorized agitation, mixing splash filling, grit blasting hoses, paint spraying and ventilation fans.

When flammable liquids are transferred from one container to another, bonding between the two conductive containers, prior to pouring, shall be in place.

6.29 Portable / Hand Tools

Adequate safety measures must govern the use of portable tools particularly:

- Tools must be inspected and appropriate color-coded
- Tools are only used for the application for which they are intended.
- All tools shall be properly stored and maintained.
- Hand tools shall be used properly and with caution to prevent slippage or injury.
- The use of adjustable spanners and wrenches as a substitute for a spanner of the correct size shall be discouraged.
- All tools shall be inspected for defects that may cause breakage or failure during use. On no account shall damaged tools be used.
- Only authorized persons shall change grinding disks.
- Wherever possible reduced voltage should be used.
- Rotating power tools such as angle grinders, threading machines, drills etc. shall be fitted With a “Dead Man Switch” that will cause automatic shutdown of the equipment when the operator no longer has control.
- All hand tools shall be of insulated type.
- All electrical tools should be earthed, unless they are ‘all insulated’ or ‘double insulated’ tools which do not require earthing.
- Employees provided with bags / box to carry bolts, nuts and hand tools.

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- Pneumatic / hydraulic hose connections properly secured.
- Tools shall be provided with adequate guard, shields or other protective devices.
- Only insulated or non-conducting tools should be used on or near live electrical installations.
- Only non-sparking tools shall be used near or in the presence of flammable Liquids / vapors or explosive dusts or vapors.
- Heads of hammers and other sharp tools shall be dressed or ground to a suitable radius on the edge as they begin to mushroom or crack.
- Tools should be switched off when not in use and positively isolated before any adjustment, cleaning or maintenance is done.
- Tools shall be provided with adequate guard, shields or other protective devices.
- Only insulated or non-conducting tools should be used on or near live electrical installations.
- Only non-sparking tools shall be used near or in the presence of flammable Liquids / vapors or explosive dusts or vapors.
- Heads of hammers and other sharp tools shall be dressed or ground to a suitable radius on the edge as they begin to mushroom or crack.
- Tools should be switched off when not in use and positively isolated before any adjustment, cleaning or maintenance is done.

6.30 Grinding

Adequate Safety Measures shall be taken by CONTRACTOR (s):-

- Always wear safety glasses or face shield while grinding.
- Do not over speed grinding wheel
- Do not use grinding wheel for cutting purpose.
- How work permit required to obtain before starting grinding work.
- Before wheels are mounted, they should undergo a visual inspection and ring test.
- Use ELCB protection for electrical supply providing to grinding machines.
- Ensure all cutting edges, teeth etc. are adequately guarded or well protected when not in use.
- Grinding Machine shall be kept at safe place and not into walkways which creates the hazard.
- Grinding Machine shall be not carried in hands when climbing up ladders. Use proper toolkit bags while climbing the ladder.

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- Contain grinding sparks by fire blanket. Cover sewers and manholes located near the source of ignition
- Assign fire watch where fire could occur and provide fire extinguisher where hot works are conducted.
- Dead man switch shall be provided for all portable grinders. The purpose is that once the pressure on the knob operating the portable grinder is released, the grinding wheel shall stop immediately.
- RPM of the grinding wheel should always be more than the rpm of grinding machine.
- Every grinding machine shall be provided with “Deadman switch”.
- Grinding machine to be monthly inspected by authorized engineer and inspection tag in assigned color coding to be displayed on it.

6.31 Lifting appliances and Gear

Lifting appliances means a crane, hoist machinery, derrick, winch, gin pole, sheer legs, jack, hoist drum, slewing machinery, slewing bearing fasteners, lofting machinery Sheave's, pulley blocks, hooks or other equipment used for lifting materials, objects or building workers and lifting gears means ropes, chain slings, shackles, hooks, lifting lugs, wire ropes, lifting eyebolts and eye nuts and other accessories of a lifting appliance..

Use of Hydra is prohibited at site. In place of Hydra, F-15 crane can be used on prior approval by Site Manager / HSE Manager.

No machine shall be selected to do any lifting on a specific job until its size and Characteristics are considered against:

- The weights, dimensions and lift radii of the heaviest and largest loads
- The maximum lift height, the maximum lift radius and the weight of the loads that must be handled at each the number and frequency of lifts to be made
- How long the crane will be required on site
- The type of lifting to be done (for example, is precision placement of loads important)
- The type of carrier required (this depends on ground conditions and machine capacity In its
- operating quadrants: capacity is normally greatest over the rear, less over the side, and non-

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existent over the front

- Whether loads will have to be walked or carried
- Whether loads will have to be suspended for lengthy periods
- The site conditions, including the ground where the machine will be set up, access roads and ramps it must travel, space for erection and any obstacles that might impede access or operation.

The CONTRACTOR shall ensure that a valid certificate of fitness issued for all lifting appliances including synchronized mobile jacks, pre-stressing hydraulic jacks, jacks fitted with launching girders etc. Only after obtaining the approval from the Consultant any lifting appliances and gear shall be used.

The laminated photocopies of fitness certificate issued by competent person, the CONTRACTOR' approval letter, the operators' photo, manufacturer's load chart and Conditions of Contract on Health, Safety and Environment, competency certificate shall always be either kept in the operator cabin or pasted on the visible surface of the lifting appliances.

All lifting appliances and loose gears shall be clearly marked for its safe working load and identification by stamping or other suitable means. The CONTRACTOR shall also maintain a register containing a system of identification of all tools and tackles, its date of purchase, safe working load, competent person date of examination etc.

6.31.1 Test and periodical examination of lifting appliances and gears

All lifting appliances including all parts and gears thereof, whether fixed or movable shall be thoroughly tested and examined by a competent person once at least in every six months or after it has undergone any alterations or repairs liable to affect its strength or stability. Within the validity, if the lifting appliances are shifted to a new site, re-examination by the same competent person for ensuring its safety shall also be done.

CONTRACTORS can utilize the services of any competent person as defined in Factories Act, 1948 and approved by Chief Inspector of Factories with the permission of the Consultant.

All alarms and signals like automatic safe load indicators (SLI), boom angle indicators, boom extension indicators, over lift boom alarm, swing alarm, hydraulic safety valves, mechanical radius indicators, load moment indicators etc. shall be periodically examined and maintained always in working condition.

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CONTRACTOR shall ensure that Equipment shall be properly marked with an identification number and safe working load and be inspected and color coded each quarter by CONTRACTORS as indicated below.

January - March	Yellow
April - June	Orange
June - September	White
October - December	Blue

Any equipment which is unfit for use must be color coded Red and removed from site immediately.

6.31.2 Automatic safe load indicators

Every lifting appliances and gears like cranes, F15 crane etc., if so constructed that the safe working load may be varied by raising or lowering of the jib or otherwise shall be attached with an automatic indicator of safe working loads approved by Bureau of Indian standards/ International certifying bodies which gives a warning to the operator and arrests further movements of the lifting parts.

Qualification of operator of lifting appliances and of signaler etc.

The CONTRACTOR shall not employ any person to drive or operate a lifting machine like crane, F15 crane etc. whether driven by mechanical power or otherwise or to give signals to work as a operator of a rigger or derricks Possesses the knowledge of the inherent risks involved in the operation of lifting appliances by undergoing a formal training at any institution of national importance acceptable to Consultant Is medically examined periodically .

6.31.3 General requirements of appliances

Out-of level

One of the most severe effects of being out-of fit level is that side loads develop in the boom. Because of side loads all mobile cranes lose capacity rapidly as the degree of out-of-level increases and therefore.

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Boom

- The boom is one of the more critical elements of the crane and must be in perfect condition at all time. No boom section with a bent lattice member shall be allowed
- All welds shall be crack and corrosion free
- No member of the boom shall be bent
- All telescopic booms shall be free from cracks, rust, flaking or cracked paint, bulges, greases or varnishes.
- The sweep area (work area) of the construction machinery shall be always free from obstructions.
- All hydraulic piping and fittings shall be maintained leak proof.
- The operator cab shall possess good and safe:
 - Structure, windows and windshield wipers
 - Drivers chair and foot rest
 - Control handles
 - Cab instrumentation
 - Telecommunication
 - Cab out fitting
- Wind indicator with an adjustable set point shall be in a position representative for the wind on the crane. The indicator shall give continuous information regarding constant speeds and gusts.

6.31.4 Mandatory rigging requirements

Rigging shall be done under experienced and qualified rigger only.

- The primary requirement in rigging shall be to assess the weight of load before attempting any lift.
- All hooks shall be fitted with Master Rings having certificate of fitness from the competent

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person, so that the hooks are subjected to balance vertical loading only.

- Only four legged slings shall be allowed which includes master link (ring), intermediate master link (ring) if necessary, chain / wire rope sling, sling hook or other terminal fitting. Conditions of Contract on Safety
- Hand spliced slings up to 32mm diameter shall not be used at site for any lifting purpose.
- No load shall be slewed over public areas without stopping the pedestrians and road traffic. A separate pedestrian path shall be provided at the beginning of site activities.
- Requirements of outriggers

All outriggers shall be fully extended and at all tyre are clear of the ground. Heavy duty blocking having large bearing area shall be necessary to prevent sinking of floats. All loads shall have tag-lines attached in order to ensure that the load can be controlled at all times.

No close working to any live overhead power line is permitted without the operation of a strict Permit to Work. Minimum lighting is to be ensured at all lifting operations. Failure to do any of the above shall attract penalty from the CONTRACTOR as per relevant clause

6.32 Use of Man-Lift (Aerial Lift, Elevated Work Platform)

- Ground condition shall be checked. Man-Lift should not place on uneven surface.
- Assess the weight/number of persons to be lifted. Man-Lift shall not operate beyond the SWL rating.
- The man-lift shall be moved slowly and carefully.
- Assign signalman/flagman during movement of man-lift.
- Ensure valid TPIs of Man lifts before use.
- Only trained, certified & authorized operator permitted to operate the Man-lift.
- Out rigger if any shall be extended fully and tyres cleared off the ground.
- Outriggers if any support plate shall have adequate strength to withstand load.
- Ensure Man-Lift, load chart is provided.
- All limit switch, Alarm, safety devices should be in good working condition.
- All limit switch, Alarm, safety devices of the Man-Lift shall be inspected before lifts.
- All limit switch, Alarm, safety devices of the Man-Lift shall never be tampered with or

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deactivated.

- Before lifting always survey the site for overhead power lines/utilities.
- If necessary Overhead utilities shall be de-energized following LOTO permit.
- Erect goal posts.
- Check clearance from overhead lines (OHL) before setting Man-Lift, considering OHL voltage.
- Do not allow boom or other parts of Man-Lift/ to come within 3m reach of Overhead utilities.
- Man-Lift should not be elevated whilst on a sloping, uneven, or soft surface. Personnel shall not be driven with the platform elevated.
- Before operating the machine, make sure all safety gates are closed and fastened in their proper position. Wear fall protection with a lanyard attached to an authorized lanyard anchorage point.
- Do not raise the platform or drive unless the machine is on firm, level surfaces and evenly supported.
- Operator should follow signals from designated rigger.
- Never attempt to use the machine as a crane. Do not tie-off machine to any adjacent structure
- Do not operate an aerial lift in high winds / heavy rain above those recommended by the manufacturer.

6.33 Use of Man Basket

- A Crane Lift Permit must be submitted by CONTRACTOR (s) for Consultant review and approval prior to making the lift.
- Man basket can be used only where and when another means of access is not possible because of structural design and site work conditions.
- Man baskets shall be inspected and certified by a competent third party agency prior to it being used at site. A copy of man baskets certification must be displayed by CONTRACTOR (s) on basket.
- Personnel occupying the man basket shall complete "Working at Height" training and follow 100% tie-off procedure.
- Prior to use each day and at each new work location, the Work Basket shall undergo a full cycle test at 200% of the maximum design capacity.
- A qualified design engineer shall design the Man Basket with a safety factor more than 5.
- Man Baskets shall be at least 1.2 m square on plan and provide head clearance which allows

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personnel to stand upright.

- Man Basket weight, maximum number of personnel, and load capacity shall be posted on the basket.
- Cranes carrying personnel in Man Basket shall be uniformly leveled within 1% of the level grade and located on firm footing.
- Crane travel shall be prohibited while carrying persons.
- The total weight of the loaded Man Basket and related rigging shall NOT exceed 25% of Crane rated capacity.
- The minimum safety factor of load hoist wire rope shall be 7.
- Lifting and lowering speeds shall NOT exceed 30 m /minute.
- Use a full body harness with double lanyards attached to the crane hook to prevent the worker(s) from being ejected or pulled from the basket.
- A Pre-Lift Meeting attended by the responsible supervisor/foremen, crane operator, signalman and personnel to be lifted shall be held before the beginning of personnel lift at each new work location and thereafter for any personnel newly assigned to the lifting work.

6.34 Heavy Lifts

The CONTRACTOR shall submit detailed rigging studies plan for Owner / Consultant 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. CONTRACTOR shall generate the "Permit for heavy lift/critical erection". 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 equipment utilized for the job. The CONTRACTOR shall, at all times, be responsible for all rigging activities.

The CONTRACTOR shall ensure medical fitness of all workmen who are engaged / involved in erection of equipment, vessels etc. and such fitness checks shall be carried-out every six months interval with the help of a registered medical practitioner & record shall be maintained. Use Tools & tackles with sufficient strength having capacity at least of 120% of actual load to be lifted. In case of lifting equipment

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more than 40 Ton, Qualified lifting engineer of CONTRACTOR(s) shall endorse.

Adequate safety measures such as positive barricading, usage of appropriate PPEs, permit to work, etc. shall be taken during all heavy or critical lifts. For lifting any material (irrespective of shape, size or volume), at any height, it is always advisable to prepare a Plan of Erection (PoE) taking into consideration hazards & risks associated therein – this can enable people to put their own experiences of various natures & side-by-side establish a practical method for risk-free erection / lifts.

The CONTRACTOR shall prepare PoE & shall document the same, when risks are identified as “medium” or “high” and the same shall be approved by its competent / qualified engineer.

6.35 Excavation

The CONTRACTOR shall obtain permission from competent authorities prior to excavation wherever required. The CONTRACTOR shall locate the position of buried utilities (water line, cable route, etc.) by referring to project / plant drawing / in consultation with Owner/ Consultant. The CONTRACTOR shall start digging manually to locate the exact position of buried utilities & thereafter use mechanical means.

The CONTRACTOR shall keep soil heaps at least 1.2 M away from edge or a distance equal to depth of pit (whichever is more) The CONTRACTOR shall maintain sufficient “angle of repose” during excavation – shall also provide slope or suitable bench as decided by Owner/ Consultant. The CONTRACTOR shall arrange “battering” or “benching” wherever required for preventing collapse of edge of excavations. The CONTRACTOR shall identify & arrange de-watering pump or well-point system to prevent earth collapse due to heavy rain / influx of underground water.

The CONTRACTOR shall arrange protective fencing / barricading with warning signal around excavated pits, trenches, etc. along with minimum 2 (two) entries, exits / escape ladders. The CONTRACTOR must avoid “underpinning” / under-cutting to prevent collapse of chunk of earth during excavation. The CONTRACTOR shall use “stoppers” to prevent over-run of vehicle wheels at the edge of excavated pits / trenches. The CONTRACTOR shall arrange strengthening of “shoring” & “strutting” proactively to avoid collapse of earth / edges due to vehicular movement in close proximity of excavated areas / pits / trenches, etc.

Take "Confined space entry permit" (excavation $\geq$ 1.5 meter depth) in addition to "Excavation Work

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Permit" for Excavations having more than 1.5 m depth & width is also more than 4.5 m but where release of toxic/poisonous/flammable fumes, gases is possible by any means (through soil or ruptured pipe line) Or Excavations having more than 1.5 m depth & width is also more than 4.5 meter but access is very critical.

6.36 Road work

Site shall be barricaded and provided with warning signs including night warning lamps at appropriate locations for traffic diversion.

Experienced drivers with valid driving license shall drive road rollers, bitumen sprayers and pavement finishers and all vehicles on site.

Employees handling hot bitumen sprayers or spreading bitumen aggregate mix or mixing bitumen with aggregate shall be provided with PVC hand gloves and rubber gumboot up to knee joints. If bitumen accidentally falls on ground, sprinkle sand immediately to cover it and to prevent anybody stepping on it. It shall then be removed with the help of spade.

For cement concrete roads, besides site barricading and installation of warning signs for traffic diversion, safe practices mentioned in the section on 'Concreting' shall be also applicable. Use PPEs such as Safety Goggle, Apron, Safety helmet, Dust mask and Safety Shoes at site.

6.37 Piling / Boring

Adequate Safety Measures shall be taken by CONTRACTOR (s):-

- All rig accessories must be thoroughly examined & certified by 3rd party competent authority.
- Only trained or authorized persons shall operate the piling/boring rig and other equipment. Competency certificate of rig operator to be submitted to Consultant.
- Piling/boring area shall be barricaded and sign boards should be installed.
- Surface of the piling/boring area shall be levelled for the safe movement of Rigs.
- Pile pieces once removed during dressing operation shall not be left on edge of excavated pit; it shall be shifted to designated area. Check underground utilities before work commences.
- Guys, outriggers or counter weight shall be provided for stability.

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- Route the electrical cables such that they will not get damaged mechanically and will not come in contact with water.
- Guards for rotating parts of machines are in place.
- Wear ear plug/muffs when working at high noise area.
- Periodic servicing & maintenance to rig, all the parts & accessories shall be done.
- Discard the damaged or cracked accessories immediately. Replace them at once.
- Ensure sound condition of the main rope attached to the hammer and is in accordance with the weight of the hammer.
- Ensure proper tightness, slackness of the guy ropes as per requirement of the job.
- Use of Tripod type of rig for boring/piling is not allowed. Rigs shall be inspected as per checklist during piling and boring.

6.38 Bar Bending and Cutting

Only trained persons shall carry out bar bending and cutting activities. Supervisor shall ensure that all rotating parts are guarded. Good housekeeping shall be maintained in bar cutting area. Protruding bars shall be cut or guarded. Use safety helmet, safety shoes, safety goggles, and leather gloves while Bar Bending and Cutting.

6.39 Shuttering

Cutting machine shall be guarded while cutting and joining plywood. Shutters shall be stacked and stored properly. Loose shuttering shall be secured properly to prevent fall of shutters. Shuttering activity shall be barricaded. Rebar's shall be capped / secured to prevent injuries.

6.40 Structural Work, Laying Of Reinforcement Concreting

Structural steel or prefabricated parts should be stored and handled in such a manner that they shall not fall or overturn. Racks are to be set on firm ground. Structural steel or prefabricated parts should be lifted, by methods or appliances that prevent them from spinning accidentally. While structural steel or prefabricated parts are being erected, the employees shall be provided with appliances for guiding them as they are being lifted and set down, so as to avoid crushing of hands and to facilitate the

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operations. Use of such appliances should be ensured.

A raised structural steel or prefabricated part shall be secured against external agencies such as wind and passing loads before its release from the lifting appliance. When adverse weather conditions such as high-speed wind or reduced visibility entail risks of accidents the work should be carried on with particular care, or if necessary, interrupted. Personnel shall not be on any scaffold or other temporary elevated work area during storms or high winds - sustained winds more than 65 kph (40 mph) - unless the scaffold or working level is indoors or otherwise unaffected by the weather conditions. Outdoor scaffolds or elevated work platforms shall not be used during thunderstorms or when there is likelihood of lightning. Structural steel parts that are to be erected at a great height should as far as practicable be assembled on the ground.

When structural steel or prefabricated parts are being erected, a sufficiently extended area underneath the workplace should be barricaded or guarded and no one shall be allowed to work underneath. Ensure that employees use PPE like Safety Helmet, Safety Hand gloves, Safety Shoes.

6.40.1 Reinforcement

All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of piercing. Ensure that employees use PPE like safety helmet, safety shoes, safety glasses / goggles, gloves etc. DO NOT stand on cantilever rods. While transporting material by trucks / trailers, the rods protruding outside should be tied and tagged with red flags/lights.

6.40.2 Concreting

Barricade the concreting area while pouring at height / depths. Keep vibrator hoses, pumping accessories in good condition. Pipelines in concrete pumping system shall not be attached to temporary structures such as scaffolds and formwork support as the forces and movements may affect their integrity.

Safety cages & guards around moving motors/parts etc. should be provided in concreting mixers.

Use PPEs like gloves, PVC / Rubber, Safety Shoes / Gumboots with steel toe, safety goggles, safety helmet etc. while handling concrete and wear respirators for handling with cement. Use Safety shoes, while climbing on structure/ scaffold or at higher elevation. Earthing of electrical mixers, vibrators, etc. should be done and verified. Cleaning of rotating drums of concrete mixers shall be done from outside. LOTO Work Permit with positive Isolation / and tag out devices shall be ensured prior to entry.

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Where concrete mixers are driven by internal combustion engine, exhaust points shall be located away from the employee workstation so as to eliminate their exposure to obnoxious fumes. Ensure adequate lighting arrangements for carrying out concrete work during night. Projected re-bars which may cause injury shall be provided with protective caps/covers.

6.41 Temporary Structure / Fixtures

Before erecting temporary shelters like sheds or tents anywhere within the site/plant premises, written permission of the concerned authorities must be obtained. Temporary fixtures like; sheds, tents, etc. shall be erected in conformity with normal safety standards. Thatched roof to such fixtures will not be permitted.

Temporary piping, hose connections and electrical wiring must be laid as in such manner that they do not cause tripping or hitting hazard. Temporary sheds can be constructed only for the storing of the material /site office. It should not be used for any other purpose. The shed shall be made of safe construction material and good aesthetic view. The shed shall be made strictly at the authorized location and size. All windows shall be either of wire mesh or glass.

After completion of the job, shed must be demolished informing to concerned authorities and area must be cleaned. All precautions shall be taken to ensure that any temporary electrical wiring used within Plant premises will not cause spark or shock.

6.42 Gas Cylinders

Gas Cylinders utilized in flame cutting and welding shall:

- CONTRACTOR (s) shall not use LPG gas cylinder inside site.
- Where a cylinder is designed to accept a valve protection cap, caps shall be in place except when the cylinder is in use or connected.

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- Be checked for leaks by means of soapy liquid applied to each joint.
- Be stored separately, oxygen and acetylene cylinders shall be at least 5 meters apart.
- Be stored vertically, separated and marked 'EMPTY' or 'FULL'.
- Be stored in well-ventilated areas.
- Be shielded from direct sunlight or any heat /ignition source.
- Be secured vertically during use and transportation. Cylinders shall never be used in a horizontal position.
- Not be lifted by any slings, rolled or used as rollers themselves.
- Be fitted with Flashback Arrestors at the torch and the regulator, being devices designed to prevent an explosive mix developing in either cylinder.
- No attempt shall be made to transfer gas from one cylinder to another.
- The regulator and other equipment shall be connected and a test shall be made to ensure that all joints are gas tight and free from leakage and shall be suitable for the equipment being used.
- Be fitted with approved pressure reducing regulator and gauges for the intended use.
- Not have joint fittings on acetylene cylinders made of copper or silver, as when in contact with the gas, these metals form explosive compounds.
- No jointing compound or grease shall be applied to the threaded joints of the cylinders and fittings.
- Have leaking cylinders taken out of service immediately, removed outdoors and closely attended until completely and safely depressurized.
- Not have cylinders positioned directly beneath a working area as molten metal may fall onto hoses causing leaks and possibly igniting the gases.
- Hoses shall be inspected regularly. If a hose is found to be leaking a few millimeters of the hose nearest the torch and regulator, which is subjected to the hardest use, shall be cut off and the hose reattached. Hoses shall not be taped to try and prevent gas leaks.
- Only IS or equivalent international standard hoses, regulators, pressure gauges, valves and flash back arrestors shall be used.
- CONTRACTOR (s) shall take the precautions that no hot work or Smoking carried out where gas cylinders are stored. CONTRACTOR (s) to Display the board in English, Hindi and Local Language "NO SMOKING" & "NO HOT WORK" at storage of gas cylinders.

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- Dry chemical fire extinguisher shall be readily available at the work area.
- Provide Flash Back arrestor /NRV complying IS 11006/EN 7301/ISO 5175 std or other equivalent standard.
- Provide gas cylinder hoses complying IS447 or other equivalent standard.

6.43 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. Empty & filled-up gas cylinders shall be stored separately with TAG, protecting them from direct sun or rain. Minimum 2 nos. of Portable DCP type fire extinguishers (10 kg) shall be maintained at the gas cylinder stores. Stacking & storing of compressed gas cylinders shall be arranged away from DG set, hot works, Elect. Panels / Elec. boards, etc. The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrestor/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. Cutting of metals using gases, other than oxygen & acetylene, shall require written concurrence from Owner.

All welding machines shall have effective earthing at least at distinctly isolated two points. 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. The hoses of Acetylene and Oxygen shall be kept free from entanglement & away from common pathways / walkways and preferably be hanged overhead in such a manner which can avoid contact with cranes, hydra or other mobile construction machinery.

Hot spatters shall be contained / restricted appropriately (by making use of effective fire-retardant cloth/fabric) and their flying-off as well as chance of contact with near-by flammable materials shall be stopped. The CONTRACTOR shall arrange adequate systems & practices for accumulation / collection of metal & other scraps and remnant electrodes and their safe disposal at regular interval so as to maintain the fabrication and other areas satisfactorily clean & tidy. All gas cylinders must have a cylinder cap on at all times when not in use.

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6.44 Radiography

CONTRACTOR (s) shall conduct Radiography only after receipt of the Approved Radiography work permit. Only trained and competent person shall be allowed to work. Prior to start the activity JSA/TRA to be conducted and get approved by the CONSULTANT/PMC. All the precautions to taken to avoid the exposure of employees to Radiation during the use of Radiography Equipment.

CONTRACTOR (s) shall be responsible for the safe storage of the radio graphic sources.

Radiography shall be carried out only outside of normal working hours i.e. usually night time and following completion of all other work activities.

- All site personnel are to comply with the Radiography Work Permit requirements.
- Radiography shall be carried out from certified or authorized agency from AERB / BARC and under supervision of RSO (Radiography safety officer).
- Only the authorized Radiation Protection Officer / Radiographer (RPO) shall handle Radioactive Equipment as required by from AERB / BARC.
- Radioactive Material shall be placed under the direct control of the RPO and under no circumstances shall radioactive material be handled without the attendance of the RPO.
- Radiography Permits shall not be issued until the area of the work has been checked and all personnel, other than personnel performing the radiography work, are directed out of the work area.
- Radiography Permits issued for other tasks shall be reviewed and rescinded if necessary in order to prevent unauthorized personnel from being within the regulated area.
- The designated RPO performing radiography shall be responsible for establishing boundaries around the radiography work area with Magenta and Yellow barricade tape and signs showing magenta letters and symbols on a yellow background, to warn personnel that hazardous work is in progress.
- This shall include structures or those working at different elevations. Additionally at every corner boundary a flashing light shall mark the perimeters where the work is being performed.
- Hand Operated "Manual Siren" to be provided at site by the CONTRACTOR (s) to give the

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Radiography start & Stop alarm at site.

- Only persons approved in the Radiography Permit shall be allowed inside the radiography boundary. Stairs, ladders or other means of access to the restricted area must be tape barricaded and the radiation caution sign in place.
- All personnel involved in radiography shall be equipped with personnel monitoring devices to control the level of exposure to radiation. Established maximum exposure levels shall not be exceeded.
- Radiography source storage pit shall be approved by AERB / BARC.
- A lockable security fence shall surround the pit. Signs indicating the hazardous nature of the stored materials and emergency telephone number/s of contact personnel shall be displayed at the security fence.

6.45 Catalyst Storage and Handling

A) CONTRACTOR shall ensure the following criteria during catalyst Storage and Handling

- The catalyst containers are to be handled carefully without bumping and must never be rolled to avoid any damage of the catalyst.
- The catalyst drums should be inspected carefully for damage during shifting from store to site, and Drums must not be stacked on their sides or stacked more than four drums high, even when held on pallets.
- The lids should be left on the drums until just before the catalyst is to be charged, and if the lids are accidentally knocked off or removed for inspection, it is important that they should be replaced as soon as possible, so that contamination of the catalyst is avoided. If the drum lid cannot be replaced, then the catalyst should be re-drummed without delay, this process shall be carried out in presence of CONTRACTOR's representative.
- Handled the Catalyst drums as gently as possible. Suitable space is required for storing the drums between deliveries and charging, and double handling shall be avoided if this space is close to the equipment to be loaded.

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- Catalyst Drums must not be rolled, and if manual handling is unavoidable, the suitable drum barrows, opening levers and skids should be provided.
- Adopt a good method of sieving, which is to pass the catalyst over a simple inclined screen, since vibrating screens can cause additional unnecessary damage and loss. The mesh spacing should be about half of the smallest dimension of the catalyst pellet.
- Suitable masks must be provided for those who are engaged in this kind of operation, and some Provisions should be made to collect the fines for disposal, based on catalyst supplier recommendation.
- Reforming catalyst does not usually require sieving, but CONTRACTOR shall ensure broken rings should be removed whilst the socks are being charged, since relatively broken rings can affect the tube pressure drop significantly.
- CONTRACTOR shall make an assessment of incompatibility of Catalyst as per MSDS recommendations. Flammable substances shall not be stored with oxidizing substances.
- All the substances can be kept in three categories – one which does not burn, other which burn and the third one, which produces oxygen and may be the cause of fire. While storing, the first thing is that the solids and liquids should be kept separately and the properties must be seen before it is decided to store at one place.

B) CONTRACTOR shall ensure to follow/ implement the below General applicable safety rules during Catalyst Loading.

- Wear protective clothing and gear provided and required for plant operation.
- Wear a Full body Harness double Lanyard this Shock absorber when working at elevated locations if adequate protection against falling is not available.
- Wear a suitable air mask when working on pipelines or equipment containing hydrocarbons, toxic gases or chemicals.

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- Use the correct hose for air, water, steam or chemicals; secure it during use. Tag any hose that needs repairing and send it to the workshop. Clean chemical hoses after use.
- Be sure that hoses are in good condition and that all connections are tight so that there is no chance of leakage that could result in a hazardous situation.
- When using steam hoses, crack the steam valve at first until all water in the hose is discharged and the hose is heated up. This will prevent high velocity water jets from the hose.
- Report hazards immediately and take all measures to mitigate the hazard.
- Wear goggles and gloves while taking samples.
- Be thoroughly familiar with the location and operation of all firefighting equipment, blankets, safety showers, gas mask, and other safety equipment.
- When giving clearance to maintenance to perform work in the unit, be sure the equipment is in a safe condition to work on. Be specific in your instructions and be sure that they are understood and followed. Check to see if instructions are being observed.
- Isolate the equipment to be opened for clean-out or repairs. Leave rest of the equipment inactive with valves closed. Isolation is to be done by blinding-off.
- Purge the equipment with nitrogen, especially those that have contained H₂S and hydrocarbon. Thereafter, steam-out with purge steam to remove heavy hydrocarbons. While purging and during initial steam-out operations, vent to flare.
- Close vent, and open the drain. Steam-out any liquid to the sewer for half an hour. Beware that hydrocarbons can contain H₂S and that release of H₂S from the drained-out condensate could occur.
- Check for the presence of hydrocarbon vapors within certain proportions. If toxic vapors present, a test for these should be made.

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- Precaution in loading unloading of catalyst drums. Drums shall be kept on pallets. This includes safety precaution of crane & lifting tools/tackles.
- Refer MSDS & follow manufacturer safety guide line.
- Open catalyst drum by pneumatic tools.
- Catalyst fine dust is poisonous and irritating to eyes and skin, a minimum dust respirator, Apron, face mask, goggles and hand gloves to be used.
- Standard vessel entry procedure should be followed at all times, this includes minimum, followings
- Routine testing of oxygen level.
- A person stationed outside the vessel. This individual should be equipped with rescue gears and an independent air supply.
- Catalyst should be loaded, unloaded, handled, and stored under the supervision of a competent person as per guidance of Consultant, persons familiar with hazards and the precautions to be deputed for emergency.
- Be familiar with Materials Safety Data Sheets of Catalyst to be handled in the respective area.
- Lifting appliances used should be of good construction and free from defects. They should be not be overloaded or overfilled.
- When highly flammable catalyst are being loaded or unloaded, adequate firefighting equipment should be provided so that an incipient fire can be controlled immediately.
- Where necessary, non-sparking tools should be provided and used in explosive atmospheres.
- Foodstuff and other articles for consumption must be stored well away from Catalyst classified as toxic or harmful or which have a strong smell.

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- Take all the care to see that passages are not blocked. Easy accessibility should be kept to reach the substance from all the sides. In solid storage, always care should be taken to maintain first in, first out otherwise on long storage decomposition may take place causing unknown hazards.

6.46 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 Chief Controller of Explosives (CCoE) for collection, transportation, storage of explosives as well as for carrying out blasting operations. The CONTRACTOR shall prepare exclusive method statement (in cognizance with statutory requirements) for diffusing unfired explosives, if any, at project site before carrying out actual task. Nowhere blasting shall be carried out by the CONTRACTOR or its agency without the involvement of competent supervisor and licensed blaster / shot blaster

6.47 Grit Blasting

- CONTRACTOR shall produce detailed Method Statement, Risk Assessment and Job Safety Analysis prior to work commencing.
- CONTRACTOR shall ensure grit blasting shall be carried out in an enclosed designated area, levelled, and with sufficient safe access, both to the area, and around the work pieces. The grit blasting area shall be indicated by prominent warning signs.
- Only proper grit blast shall be used. Under no circumstances shall products containing free silica be used.
- Personnel involved in the actual blasting of material shall be protected by a blast hood that meets approved standards and providing both respiratory and eye protection.
- The nozzle shall be fitted with a properly functioning dead mans handle, and a standby man shall stay by the blast pot and Nozzle and hose must be earthed.
- Standby men shall be provided with suitable respiratory and eye protection.
- Spent grit shall be collected and properly disposed off.

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6.48 Painting

CONTRACTOR shall provide Specific training on the MSDS of the painting and any other solvents used in paint related work. Workers shall be instructed and trained on the hazards related to their work, particularly for long term activities, in the correct handling of chemicals and on the correct use of the equipment. CONTRACTOR shall consider HSE aspects during selection and purchasing of painting material. MSDS shall be always available.

6.48.1 Paint Handling, Storage and Preparation

- Use and storage of flammable paints and solvents shall be kept to well ventilated restricted areas;
- Fire prevention and ventilation to be maintained in storage/preparation areas;
- These areas shall be suitably marked with the appropriate warning signs;
- No painting preparation and application should be carried out close to ignition sources (welding, cutting, smoking areas, sparking tools, etc.) unless safe measure are taken;
- Electrical lighting and equipment shall be explosion-proof when required in areas where solvent vapors are likely to be present;
- Fire extinguishers shall be located at the storage and at the work areas.

6.48.2 Paint Application

- Face, eyes and skin shall always be protected;
- Avoid touching any part of the body and wear protective equipment when handling irritating materials;
- Adequately ventilate all painting areas and provide approved or equivalent respiratory protection where necessary;
- Introduction of solvents and paint in confined space shall be subjected to hazard analysis, because can cause serious health and fire risks;

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- While painting in confined space, natural ventilation may be not sufficient and forced ventilation shall be foreseen (fresh air inlet of the ventilation system should be located near the top, and the discharge should be located near the bottom);
- If the confined space has a low volume (from about 15 cube meters) then suitable respirator apparatus can be used as necessary;
- Often while painting workers are exposed to fall hazards so fall protection system shall be applied;
- Painting operators shall wash thoroughly before eating and at the end of the day. Adequate washing facilities shall be foreseen. Solvents shall never be used for personnel washing.

6.48.3 Spray Painting

- Spraying paint shall only be done by trained operators;
- All workmen spray painting shall wear chemical cartridge respirators or airline hoods depending upon the hazards of the paint (containing toxic solvents);
- Overall or other full body working dress shall be wear by spray painters;
- All pressurized equipment shall be handled carefully. System, hoses, etc. shall be anti-static type and so grounded as needed;
- Operators and their assistants shall know how to operate and de-energize the equipment in accordance to manufacturer's recommendations;
- Before using airless spray equipment, all guards recommended by the manufacturer shall be in place (hoses, conjunction safe lash, etc.) and the system shall be grounded to prevent static build-up; No spray gun should be pointed at anyone or part of the user's body;
- The area around spray painting activity should be enclosed by fence thick net (better if fire resistant) or equivalent to protect outside personnel and things from paint over spray. Work areas shall be kept as clean as practicably possible;
- Spray paint should be limited in windy situation.

6.49 Pressure Testing

Job safety analysis shall be conducted prior to any pressure test.

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The person in charge of hydrostatic testing must fully understand the safety requirements and procedures involved with pressure testing. All persons who will work on the pressure test must be informed of the potential hazards and the necessary safety precautions.

A work permit shall be issued prior to commencement of hydrostatic test operations.

6.49.1 Supports

Piping, vessels, supports and foundations designed for gas service shall not be overloaded by the extra weight of the test liquid. Temporary supports and braces may be required.

6.49.2 Vent Drains and Blinds

- Vents of adequate capacity shall be installed at high points, to vent air / gas from the item while it is being filled with the test liquid.
- Hazardous gases or vapors must be vented clear of any area where personnel are working or where there is any possible source of ignition.
- Drains must be installed at a suitable location to allow removal of the test liquid.
- Only approved rating blinds shall be used and all vent bolts tightened to proper torque levels
- HP pipe end points and areas very close to HP vents shall be barricaded and suitable safety signage displayed in local languages and English.

6.49.3 Valves

Where isolation valves are used to contain test pressures, they must be of adequate rating for the pressure to be encountered. If isolation valves are used in lieu of blinds, provisions shall be made to ensure that no over-pressurizing can occur in equipment that is not being tested, due to possible valve leak.

6.49.4 Vacuum

On vessels or tanks which could collapse if subjected to a vacuum, there must be sufficient vent relief capacity to assure that the vessel cannot be subjected to a vacuum by draining the test fluid or by sudden cooling.

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6.49.5 General Requirements

- Do not approach system never previously tested, corroded piping or vessels, or vessels with welds never previously tested during the stepwise increase in pressure to the strength test pressure.
- After the strength test pressure has been reached and held for a specified interval, the equipment may be approached.
- The actual pressure at which the system under test will be approached for close inspection shall be specified in the test procedure.
- Pressure relief valve(s) shall be used to prevent over pressuring of the equipment.
- Any ancillary equipment not under test must be isolated by valves or blind flanged and vented or disconnected.
- Only calibrated test gauges and recorders shall be used and test gauges should be mounted in the upright position. Pump discharge gauges must be visible to the pump operator for the duration of the test.
- The equipment / vessel shall have adequate vacuum relief capacity to avoid damage or collapse, when draining the test liquid.
- Lines should be drained and dried mechanically when the test liquid is corrosive or otherwise hazardous. The pressure rise during a pressure test should be gradual and under control to allow time for material to strain, and time for personnel to check for leaks.
- A system under test shall be depressurized (with the exception of pressure due to a liquid head) before any work is done to stop leaks or repair weakness, including the tightening of bolts. In tightness tests, bolts may be tightened without depressurizing, if specifically approved in the written test procedure.
- A block valve is required on the line from the test pump to the equipment under test.
- Air shall not be used to displace test fluid from underwater equipment unless it has been determined that the equipment will not float.
- Salt water must not be used for testing any material subject to stress corrosion cracking in the presence of chloride ions (such as stainless steel type 304 or 18.8 - CrNi).

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- Possible changes in pressure due to thermal expansion, contraction or hydrostatic heads must be taken into account.
- Written procedures approved prior to testing shall be followed for the disposal of test mediums containing chemical additives for control of corrosion or bacteria.
- All tests need test manifold fitted with gauge, valve and PRV. The test manifold need to be certified.
- No homemade/non-standard flanges shall be used for testing purposes.

6.50 Compressed Air

All air receivers and compressors shall be in good condition and properly maintained. Air receivers shall be individually identified and marked with their safe working pressure. All air receivers must be fitted with a properly set pressure relief valve. Air receiver and related relief valve shall be accompanied by a valid test certificate, which shall be kept on site by CONTRACTOR and shown to the Consultant representative before bringing the vessel onto site. Guard should be constructed to compressed air in order to prevent worker to get into contact with the hazardous machine. Air receivers shall be examined and the pressure relief valve tested by an independent examiner at yearly intervals.

A register of all air receivers containing:-

- Individual identification numbers
- Dates of independent inspections
- Name and signature of independent examiner
- Rated safe working pressure
- Pressure at which pressure relief valve lifted shall be kept on site by CONTRACTOR .

All compressed air fittings shall be wired and/or restrained to prevent them from whipping should the coupling be broken. Only hose clamps designed for compressed air service shall be used. Worm drive (Jubilee) clips are not acceptable.

6.51 Demolition/ Dismantling

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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 Owner / Consultant at no extra cost. Before carrying out any demolition/ dismantling work, the CONTRACTOR shall take prior approval of Owner/ Consultant and generate. For revamp jobs in operating plants where location of underground utilities is not known with certainty, the CONTRACTOR shall depute an experienced engineer for supervision and shall make adequate arrangements for Firefighting & First-Aid during the execution of these activities.

The CONTRACTOR shall arrange approved Job Safety Analysis (JSA) / Method Statement for the specific demolition / dismantling task and corresponding action plan commensurate with hazards / risks associated therein. In no case any activity related to demolition / dismantling shall be carried out by the CONTRACTOR without engaging own supervision / field engineer.

6.52 Maintenance Work-Machine, equipment, DG, etc.

Preventive maintenance schedule of vehicles, tools, equipment, etc. shall be prepared and done according and pertaining records shall be maintained. All electrical, mechanical, construction equipment and /or construction vehicle, power operated and battery operated equipment, machines and tools shall be certified and inspected by concerned CONTRACTOR (s) discipline jointly with HSE and provide colour code of the month on the machine, tools and/or equipment. Each machine, tools or equipment shall be inspected every month with defined colour code.

CONTRACTOR (s) must maintain the records of all inspection and maintenance activities and to produce whenever demanded by Owner / Consultant. Legal requirements shall be followed for DG Sets as per Indian Electricity Act/Rules and Environment Protection Act/Rules. Practice preventive maintenance of vehicles and machines and maintain associated records and documents. Exhaust of the prime mover, if IC engine is used, should be fitted with PESO approved spark arrester (in case of work in hazardous area).

6.53 Stoppage of Work

The Consultant shall have the right to stop the work at his sole discretion, if any unsafe condition or

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unsafe act is found . In such cases, the CONTRACTOR shall be informed in writing about the nature of hazards and possible injury / Incident. The CONTRACTOR shall not proceed with the work until he has complied with each direction to the satisfaction of Consultant.

The CONTRACTOR shall not be entitled for any damages / compensation for stoppage of work, due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages

6.54 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 and approval from the Owner.
- h) Care shall be taken to prevent hitting underground facilities such as electrical cables, hydrocarbon piping during execution of work.

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- 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.
- l) Sewers, drains, vents or any other gas escaping points shall be covered with flame retardant tarpaulin.
- m) 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.
- n) 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) Hydro carbon detector & Multi Gas detectors(standalone type with loud siren type) shall be installed in gas leakage prone areas as per requirement of Owner's plant operation personnel.
- s) Experienced full-time safety personnel shall be exclusively deployed to monitor safety aspects in running plants
- t) CONTRACTOR shall be responsible for arranging suitable communication system as applicable for the construction activities to be carried out inside the refinery as mobile phones are not allowed inside the running refinery.

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7. EMERGENCY PREPAREDNESS & RESPONSE PLAN

The CONTRACTOR shall prepare and submit Emergency preparedness & Response Plan for approval of their respective work sites within 30 days of site mobilization. The plan shall integrate the emergency response plans of the CONTRACTOR.

The Emergency Response Plan shall detail the CONTRACTOR's procedures, including Construction Phase and pre-commissioning & commissioning Phase referring site HIRA. detailed communications arrangements, for dealing with all emergencies that could affect the Site. This include where applicable, injury, sickness, evacuation, fire, chemical spillage, severe weather and rescue.

Emergency awareness trainings shall be part of Site Emergency preparedness and response Plan. Employees shall be fully made aware about potential emergencies and their role and responsibilities during emergencies in HSE induction and subsequent emergency management awareness programs.

The CONTRACTOR shall ensure that an Emergency Response Plan is prepared to deal with emergencies arising out of :

- Fire and explosion
- Collapse of lifting appliances and equipment
- Collapse of building or structure etc.
- Gas leakage or spillage of dangerous goods or chemicals
- Bomb threatening, criminal or terrorist attack
- Drowning of worker and Landslides getting workers buried floods, Earthquake, storms etc.

8. ENVIRONMENTAL MANAGEMENT

8.1 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.

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The waste that cannot 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 Owner/ Consultant 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.

8.2 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 disposes off any such materials without the express authorization of Owner/ Consultant. An indicative list of Statutory Acts & Rules relating to HSE to be displayed

8.3 Weather Protection

CONTRACTOR shall take appropriate measures to protect workers from severe storms, rain, 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. Effective arrangement (without creating inconvenience to project facilities & permanent installations) for protecting workmen from hailstorm, drizzle in the form of temporary shelter shall be made at site

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8.4 Air Quality

The CONTRACTOR shall take all necessary precautions to minimize fugitive dust emissions from operations involving excavation, grading, and clearing of land and disposal of waste. He shall not allow emissions of fugitive dust from any transport, handling, construction or storage activity to remain visible in atmosphere beyond the property line of emission source for any prolonged period of time without notification to the Consultant.

The CONTRACTOR shall use construction equipment designed and equipped to minimize or control air pollution. He shall maintain evidence of such design and equipment and make these available for inspection by Consultant.

If after commencement of construction activity, Consultant believes that the CONTRACTOR'S equipment or methods of working are causing unacceptable air pollution impacts then these shall be inspected and remedial proposals shall be drawn up by the CONTRACTOR, submitted for review to the Consultant and implemented.

In developing these remedial measures, the CONTRACTOR shall inspect and review all dust sources that may be contributing to air pollution. Remedial measures include use of additional/ alternative equipment by the CONTRACTOR or maintenance/modification of existing equipment the event that approved remedial measures are not being implemented and serious impacts persist, the Consultant may direct the CONTRACTOR to suspend work until the measures are implemented, as required under the Contract.

CONTRACTOR'S transport vehicles and other equipment shall conform to emission standards fixed by Statutory Agencies of Government of India or the State Government from time to time. The CONTRACTOR shall carry out periodical checks and undertake remedial measures including replacement, if required, so as to operate within permissible norms.

The CONTRACTOR shall establish and maintain records of routine maintenance program for internal combustion engine powered vehicles and equipment used on this project. He shall keep records

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available for inspection by Consultant. Emission level shall be as prescribed by standards.

The CONTRACTOR shall cover loads of dust generating materials like debris and soil being transported from construction sites. All trucks carrying loose material should be covered and loaded with sufficient free-board to avoid spills through the tail board or side boards.

The CONTRACTOR shall promptly transport all excavation disposal materials of whatever kind so as not to delay work on the project. Stockpiling of materials will only be allowed at sites designated by the Consultant. The CONTRACTOR shall place excavation materials in the dumping/disposal areas designated in the plans.

The temporary dumping areas shall be maintained by the CONTRACTOR at all times until the excavate is re-utilized for backfilling or as directed by Consultant. Dust control activities shall continue even during any work stoppage.

The CONTRACTOR shall place material in a manner that will minimize dust production. Material shall be minimized each day and wetted, to minimize dust production. During dry weather, dust control methods must be used daily especially on windy, dry days to prevent any dust from blowing across the site perimeter.

The CONTRACTOR shall water down construction sites as required to suppress dust, during handling of excavation soil or debris or during demolition. The CONTRACTOR will make water sprinklers, water supply and water delivering equipment available at any time that it is required for dust control use. Dust screens will be used, as feasible when additional dust control measures are needed specially where the work is near sensitive receptors.

The CONTRACTOR shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from work sites such as construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt.

The CONTRACTOR shall design and implement his blasting techniques so as to minimize dust, noise, vibration generation and prevention fly rock. Blasting technique should be consistent not only with nature and quantity of rock to be blasted but also the location of blasting.

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The CONTRACTOR shall give preference to explosives with better environmental characteristics. The CONTRACTOR shall protect structures, utilities, pavements roads and other facilities from disfiguration and damage as a result of his activities. Where this is not possible, the Consultant shall restore the structures, utilities, pavements, roads and other facilities to their original or better, failing which the rectification/restoration work shall be carried out at the risk and cost of the CONTRACTOR. The CONTRACTOR shall submit to the Consultant an Air Monitoring and Control Plan (AMCP) under contract specific Site Environmental Plan to guide construction activity insofar as it relates to monitoring, controlling and mitigating air pollution.

8.5 Dust Control

Dust Control measures shall be implemented at all construction sites, where there will be major soil disturbances or heavy construction activity, such as cleaning, excavation, demolition or excessive vehicle traffic. Dust control measures include:

- Sprinkling: Ground surface shall be sprinkled with water until it is moist. But excess sprinkling may create mud puzzle disturbing the vehicular movements.
- Vegetation: Saplings will be planted near site offices.
- Make low height of the heap of aggregates, fine material while storing. Cover the heaps with empty gunny bags.
- Limit vehicles to designated tracks that can be regularly watered during dry periods.
- Ensure all site traffic adhere to the site speed limit.
- Ensure vehicles are covered during transportation of material.
- Restrict vehicle movements to designated routes. If possible, heavily used vehicle routes shall be paved with hardcore/ aggregate or other stabilizing material.
- Ensure site is managed to limited materials which can become airborne and improve general housekeeping activities to mitigate dust generated due to an untidy site.
- Ensure that during the site induction the workforce is made aware of dust generation and control measures.
- Vegetation clearing shall therefore be carried out on a needs basis and over limited spatial extents where possible.

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Monitoring, Measurements and Reporting

In order to ensure the effective ongoing implementation of this procedure, it is necessary for CONTRACTOR (s) to conduct regular monitoring and inspection, and report any non-conformity to their management.

The following key areas shall be monitored by CONTRACTOR (s) (by self or and by MOEF/PCB approved third party/Lab) for their respective owned/hired vehicles / equipment / plants / machines and allocated area: All Vehicles shall possess valid PUCs. Any out of legal permissible limit Vehicle shall be serviced.

All connected DGs noise and stack emission shall be monitored six monthly for key pollutants as specified by Owner / Consultant.

Ambient Air & Noise shall be monitored six monthly minimum at two sample locations for following key pollutant. Mandatory Parameters to monitor : SO₂, NO₂, PM₁₀, PM_{2.5}, Ozone, Lead, CO

Parameters to monitor depending upon site air pollution sources / aspects & impacts study or requirement from Owner / Consultant: Ammonia, Benzene, Arsenic, Benzo (a) Pyrene and Nickel.

Site walk inspections should be used to monitor for excessive visible engine/ motor emissions (i.e. black smoke), with offending vehicles and equipment removed from site until the motor can be repaired or replaced. Dust emissions shall be monitored as part of site walks/ inspections, and any particularly dust generating activities recorded, along with corrective action taken

8.6 Water Quality

The CONTRACTOR shall comply with the Indian Government legislation and other State regulations as they relate to water pollution control and monitoring. A drainage system should be constructed at the commencement of the Works, to drain off all surface water from the work site into suitable drain outlet.

The CONTRACTOR shall provide adequate precautions to ensure that no spoil or debris of any kind is pushed, washed, falls or deposited on land adjacent to the site perimeter including public roads or existing stream courses and drains within or adjacent to the site. In the event of any spoil or debris from

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construction works being deposited or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the CONTRACTOR to the satisfaction of the Consultant.

The CONTRACTOR shall ensure that earth, bentonite, chemicals and concrete agitator washings etc. are not deposited in the watercourses but are suitably collected and residue disposed off in a manner approved by local authorities.

All water and waste products (surface runoff and wastewater) arising on the site shall be collected and removed from the site via a suitable and properly designed temporary drainage system and disposed off at a location and in a manner that will cause neither pollution nor nuisance.

Any mud slurry from drilling, diaphragm wall construction or grouting etc. shall not be discharged into the drainage system unless treatment is carried out that will remove silt, mud particles, bentonite etc. The CONTRACTOR shall provide treatment facilities as necessary to prevent the discharge of contaminated ground water.

The CONTRACTOR shall discharge wastewater arising out of site office, canteen or toilet facilities constructed by him into sewers after obtaining prior approval of Owner / Consultant. A wastewater drainage system shall be provided to drain wastewater into the sewerage system.

The bentonite mixing, treatment and handling system shall be established by the CONTRACTOR giving due regard to its environmental impacts. The disposal of redundant bentonite shall be carefully considered whether in bulk or liquid form.

The disposal location will be advised and agreed with the relevant authorities. The CONTRACTOR shall take measures to prevent discharge of oil and grease during spillage from reaching drainage system or any water body. Oil removal / interceptors shall be provided to treat oil waste from workshop areas etc.

The SUB-CONTRACTOR shall apply to the appropriate authority for installing bore wells for water supply at site.

8.7 Landscape and Greenery

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The CONTRACTOR shall maintain ecological balance by preventing deforestation and defacing of natural landscape. The CONTRACTOR shall, so conduct his construction operations, as to prevent any avoidable destruction, scarring or defacing of natural surroundings in the vicinity of work.

Where destruction, scarring, damage or defacing may occur as a result of operations relating to Permanent or Temporary works, the same shall be repaired, replanted or otherwise corrected at CONTRACTOR'S expense. All work areas shall be smoothened and graded in a manner to conform to natural appearance of the landscape as directed by the Owner / Consultant.

8.8 Waste (Handling, Storage & Disposal)

The CONTRACTOR shall take all necessary precautions to minimize fugitive dust emissions from operations involving excavation, grading, and clearing of land and disposal of waste. The CONTRACTOR shall not allow emissions of fugitive dust from any transport, handling, construction or storage activity to remain visible in atmosphere beyond the line of emission source for any prolonged period of time without notification to the Owner / Consultant.

The CONTRACTOR shall cover loads of dust generating materials like debris and soil being transported from construction sites. All trucks carrying loose material should be covered and loaded with sufficient free- board to avoid spills through the tail board or side boards.

The CONTRACTOR shall promptly transport all excavated disposal materials of whatever kind so as not to delay work on the project. Stockpiling of materials will only be allowed at sites designated, if any, by the OWNER. The temporary dumping areas shall be maintained by the CONTRACTOR at all times until the excavated material is re-utilized for backfilling or as directed by Owner / Consultant.

The CONTRACTOR shall water down construction sites as required to suppress dust, during handling of excavation soil or debris or during demolition. The CONTRACTOR will provide water sprinklers, water supply and water delivering equipment available at any time that it is required for dust control use. Dust screens will be used, as feasible when additional dust control measures are needed especially where the work is near sensitive receptors.

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The CONTRACTOR shall ensure that earth, muck, detonate, chemicals and concrete agitator washings etc. are not deposited in the water courses but are suitably collected and residue disposed off in a manner approved by local authorities.

Any mud slurry from piling, drilling or grouting etc., shall not be discharged into the drainage system unless treatment is carried to remove silt, mud particles, bentonite etc. The CONTRACTOR shall provide treatment facilities as necessary to prevent the discharge of contaminated ground water.

The CONTRACTOR shall discharge waste water arising out of site office, canteen and toilet facilities constructed by him into sewers after obtaining prior approval of agency controlling the system. A waste water drainage system shall be provided to drain waste water into the sewerage system.

The CONTRACTOR is required to develop, institute and maintain a Waste Management Program (WMP) during the construction of the project for his works, which may include:

- Identification of disposal sites.
- Identification of quantities to be excavated and disposed off.
- Identification of split between waste and inert material
- Identification of amounts intended to be stored temporarily on site location such storage.
- Identification of intended transport means and route.
- Obtaining permission, where required, for disposal.

Such a mechanism is intended to ensure that the designation of areas for the segregation and temporary storage of reusable and recyclable materials are incorporate into the WMP. The WMP should be prepared and submitted to the Consultant for approval. The CONTRACTOR shall handle waste in a manner that ensures that they are held securely without loss or leakage thus minimizing potential for pollution. The CONTRACTOR shall maintain and clean waste storage areas regularly.

The CONTRACTOR shall remove waste in a timely manner and disposed off at landfill sites after obtaining approval of Conservancy and Local Municipal Corporation for its disposal.

8.9 Hazardous Chemical & Wastes

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The CONTRACTOR shall identify the nature and quantity of hazardous waste generated as a result of his activities and shall file a 'Request for Authorization' with Local Pollution Control Committee along with a map showing the location of storage area.

Chemicals classified as hazardous chemicals under "Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 of Environment (Protection) Act, 1986 shall be disposed off in compliance with the procedure given in the rules under the aforesaid act. Outside the storage area, the CONTRACTOR shall place a 'display board', which will display quantity and nature of hazardous waste, on date. Hazardous Waste needs to be stored in a secure place.

It shall be the responsibility of the CONTRACTOR to ensure that hazardous wastes are stored, based on the composition, in a manner suitable for handling, storage and transport. The labeling and packaging is required shall be easily visible and be able to withstand physical conditions and climatic factors. The CONTRACTOR shall approach only Authorized Recyclers of Hazardous Waste for disposal of Hazardous Waste, under intimation to the Consultant.

Hazardous and/or toxic materials e.g. solvent coating or thinners shall be stored in appropriate containers. Each material MSDS shall be available at the storage place. Sufficient numbers of fire extinguishers shall be deployed outside the storage area. Chemical spills shall be contained and cleaned up immediately to prevent further contamination.

Where contact or exposure with hazardous materials could have harmful effects, appropriate personal protective equipment e.g. Safety helmet, hand gloves, eye goggles, aprons, chemical resistant clothing, dust mask and respirators shall be used. In area of high noise besides other PPE ear defenders like ear plugs or ear muff shall be used.

If any waste (paints, insulation, refractory wastes etc.) encountered or generated as a result of CONTRACTOR'S activity, then all such wastes classified as hazardous under the "Hazardous Wastes (Management & Handling) Rules, 1989, amendment 2003" shall be disposed off in compliance with the procedure given in the rules under the aforesaid act.

8.10 Spill prevention and response

- Storage Ground surface will be concreted to prevent any leaks or spills from storages

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seeping into the ground.

- The impervious bund/ secondary containment system such as bund shall be as per standard specifications. If more than one container is stored, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is the greater.
- Suitable firefighting equipment will be provided in close proximity to the storage areas.
- Spill containment and clean-up materials (Spill clean-up kits) will be kept to deal with emergency spills while storage and transportation. They usually consist of equipment to contain and absorb spills and will typically include absorbent granules, sand bags, absorbent booms, absorbent pads, polythene sheeting, and polythene sacks.
- All maintenance and servicing activities will be performed in an appropriately constructed maintenance and servicing floor in order to prevent spills from seeping into the ground.
- Prior to unloading the content from a fuel, chemical or oil tank or loose barrel, hoses and connections will be checked to ensure that they are free from defects. Holding tanks will also be checked to ensure they are effectively grounded.
- Personnel handling such products will be provided with suitable and appropriate personal protective equipment, which they will be required to wear at all times. CONTRACTOR (s) shall provide training to their persons involved with the storage, handling, transport, decanting and disposal of hazardous chemicals in areas under their control.

8.11 Resource Protection

- Resources, to the extent practical, will be preserved in their existing condition. Construction activities shall be confined to areas necessary to conduct the Work as required by the Contract schedule, plans, specifications, or other documents. Environmental protective measures and procedures shall be provided to limit habitat disruption and mitigate environmental damages that may occur during construction or other activities.
- CONTRACTOR (s) employees shall not deface, injure, or destroy shrubs, grass, or other landscaping in the project or surrounding area, or remove or cut same without advance written permission from Owner / Consultant.

8.12 Energy Management

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The CONTRACTOR shall use and maintain equipment so as to conserve energy and shall be able to produce demonstrable evidence of the same upon Consultant request.

Measures to conserve energy include but not limited to the following:

- Use of energy efficient motors and pumps
- Use of energy efficient lighting, which uses energy efficient luminaries
- Adequate and uniform illumination level at construction sites suitable for the task
- Proper size and length of cables and wires to match the rating of equipment

The CONTRACTOR shall design site offices maximum daylight and minimum heat gain. The rooms shall be well insulated to enhance the efficiency of air conditioners and the use of solar films on windows may be used where feasible.

8.13 Safety, Pollution control and Energy Conservation Measures

Construction shall provide details of safety, pollution control and energy conservation measures to be undertaken under the project and estimate the cost towards the same. The amount shall be earmarked in the total project cost towards implementation of all such measures.

8.14 Sustainable Development

CONTRACTOR shall comply with Sustainable Development as CONTRACTOR considers Sustainable Development as an essential element in the corporate's asset for a deep qualification on its core business. The purpose of complying Sustainable Development is to guarantee the needs of present generations without jeopardizing the possibility for future generations to satisfy their own.

It includes:

- The activities to put in place and prevent the working place from intentional offences in the country (Security Management System)
- The implementation of the requirements of Corporate Social Responsibility.
- The activities regarding the safeguard of health of people, the prevention from incidents and the protection of the natural Environment (HSE Management System).
- The Prevention and Protection Service in the offices as required by Indian Law.

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9. HSE MANAGEMENT FOR ENGINEERING

9.1 Office Management

CONTRACTOR shall ensure to adopt Health, Safety and Environment standards at office . This is applicable to all working in the office for the Project . A detailed Office HSE plan shall be addressed incorporating all necessary Occupational Health , Safety system and Environmental requirements adopted at office.

9.2 HSE General

To ensure a safe and environmentally sound plant and facilities, it is necessary to examine the potential hazard, accessibility, constructability, operability and maintainability during the engineering phases.

Before starting the engineering work, It is required to prepare inventories of all laws and regulations applicable to the Project and the requirements on health, safety, environment (HSE), and internationally recognized HSE codes and standards that are applicable.

These inventories are communicated to all the personnel and groups concerned with engineering, procurement and construction.

A competent HSE Design lead engineer shall be responsible on the project to oversee all issues related to HSE in engineering and reporting to senior authorities.

9.3 HSE Risk Management

HSE Risk management program shall be established and implemented throughout engineering execution.

The Engineering Manager should ensure that engineers identify potential hazards, evaluates risks and takes action to avoid adverse consequences.

To ensure that, HSE reviews are integrated into the engineering cycle. The Engineering Manager shall ensure that all these reviews take place at the right time in the Project, that the actions generated are recorded and properly defined, and that a follow up of requested actions implementation is established.

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Risks associated with the operation of the facilities are quantified through the Project Quantitative Risk Assessment, under the responsibility of the HSE Design lead engineers.

Safety reviews actions close out status shall be reported monthly by Engineering manager and Project HSE Manager as project's HSE leading indicator.

9.4 Constructability

Constructability is a review performed in interface between engineering team and Home office construction team. The purpose is to ensure, as early as possible in the engineering process, the constructability of the designed facilities.

9.5 3D Reviews

Three Dimensional (3D) Model Review is conducted to confirm vehicle and personnel accessibility and operability, maintainability and constructability of the plants and facilities, and evacuation routes and assembly points at an emergency, etc.

9.6 HSE Engineering

HSE aspects of the engineering are managed by the HSE Design lead engineer, in charge of compliance of the design with COMPANY and local HSE rules and industry best practices.

The HSE Design team's areas of responsibilities are:

Risk assessment, Loss prevention engineering and Environmental engineering

10. HSE REQUIREMENT FOR PROCUREMENT

HSE Control over VENDOR's by CONTRACTOR shall be performed to ensure:

- Safety and health insurance of CONTRACTOR personnel and representatives visiting VENDOR's workshops
- Prevention of major incident at VENDOR's premises that could impact due delivery of CONTRACTOR item
- Improvement of overall VENDOR's HSE performances through HSE knowledge and experience sharing

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10.1 VENDOR's qualification

VENDOR shall have a valid prequalification certificate. For new VENDORS, the evaluation shall include HSE criteria to verify VENDOR's capability to meet Technip's principles in terms of health, safety and environment. This shall be done through HSE questionnaire, filled in by VENDOR at bidding stage and part of the Commercial bid Tabulation.

An audit at vendor premises including a HSE part could be . The audit can be performed by any project member on the basis of an audit check list or by Project HSE manager if deemed necessary.

10.2 HSE requirement to VENDORS

Minimum requirement to VENDORS shall be set up and established in particular conditions of purchase order to ensure that the level of HSE at vendor's premises will provide safe condition of visits by CONTRACTOR personnel or their representatives.

10.3 VENDOR'S HSE performances

CONTRACTOR shall follow up and monitor VENDORS HSE performances throughout the execution of the work. In case repetitive violations are reported without improvement from the VENDOR despite notification, Project Procurement and HSE Manager shall decide to perform an audit of VENDOR's premises. The outcomes of the audit and progress made by VENDOR shall serve the purpose of VENDOR final evaluation and VENDORS prequalification for future projects.

10.4 VENDOR REPRESENTATIVES

VENDOR REPRESENTATIVES (further VENDOR REP) are VENDOR personnel assigned on a WORKSITE to provide assistance or services to construction, assembly, pre-commissioning or commissioning. VENDOR REP shall comply with the HSE Rules applicable to the WORKSITE.

CONTRACTOR shall inform VENDOR of the relevant rules to apply and shall guide VENDOR into their implementation by providing necessary assistance and training.

11. SECURITY

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A detailed “Security Plan” shall be developed by the CONTRACTOR and issued on site for Owner / Consultant approval.

All the construction areas shall be duly fenced by the CONTRACTOR; the fence shall be removed at the end of the construction. No photography or videos are allowed unless previously authorized by Owner / Consultant. It is forbidden to go to areas not part of the scope of work.

The CONTRACTOR shall provide additional security as necessary to protect its own facilities and workforce within the project’s areas.

Site HSE Manager full time for the duration of the Project shall ensure the full and consistent implementation of the HSE and Security requirements of this Project and Participates with the Administration Manager and Security Manager (if foreseen), to the coordination of the onsite and off the jobsite Security matters.

Security plan shall be detailed as given below but not limited to

- Personnel admittance and control
- Visitors
- Couriers and delivery vehicles
- Material control
- Vehicle control
- General Gate Control
- Radios & Mobile Phones

12. PRE-COMMISSIONING AND COMMISSIONING PHASES

In addition to HSE controls mentioned in above part “Operation Control during Construction phase”, CONTRACTOR (s) shall follow following Operation Control during Pre-commissioning and Commissioning Phases.

12.1 Pre-commissioning and commissioning area.

Pre-commissioning and commissioning area shall be segregated with barriers / fences and safety &

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warning signs from the other units which are still under construction. Colored tape and warning signs may also be applied where hard barricades are not practical with permission of Owner / Consultant. Access to this commissioning area shall be limited; no person shall be allowed to enter inside the barricade without authorization by Pre-commissioning and commissioning group such as a pass card, a sticker, etc. Works in the commissioning area shall be authorized with the Pre-commissioning and commissioning PTW.

PPE requirement in the Pre-commissioning and commissioning area shall be decided by the Consultant & CONTRACTOR (s) HSE Managers with advice of the commissioning manager and Owner representative. All personnel in the area must complete the Pre-commissioning and commissioning safety training. Trained security guards shall ensure access control.

CONTRACTOR (s) HSE team and the Commissioning team shall hold a commissioning HSE training for all persons who are required to work in the Pre-commissioning and commissioning area including third party's personnel. Person who attends the commissioning safety training shall be recorded, identified by badge, helmet sticker and commissioning pass card.

Emergency Response Plan for Pre-commissioning and commissioning area shall be established before Pre-commissioning and commissioning activity starts by Owner, Consultant & CONTRACTOR (s) and shall be reviewed and updated as per the site condition.

Emergency Response and Evacuation Plan shall be included as follows as minimum:

- Emergency communications route and method
- Emergency site alarm, emergency egress routes, locations of muster points and rendezvous for emergency vehicles
- Required action plan for site emergency organization for each case
- Emergency drill shall be carried out periodically .

As the new plant is going put up inside the running refinery no Mobile phones are allowed during the Construction-commissioning and commissioning stage,. Hence Contractor shall do the all communications shall use either dedicated land lines or approved intrinsically safe radio systems (Walky-Talky) e.g. explosion-proof type radios,etc. Spark arrestors shall be provided on the vehicle and

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engines exhaust outlet.

Daily Pre-commissioning and commissioning meeting shall be held to address the overall plant Pre-commissioning and commissioning activities including weekly look ahead, progress, interfaces, simultaneous work activities, safety, emissions, utilities requirements, security, etc. Representatives for all related personnel include HSE Manager shall attend this meeting.

The CONTRACTOR (s) Commissioning Manager shall issue written Commissioning Notice before main commissioning activities (e.g. power receive, nitrogen in, hydro-carbon in, main rotating machine test and in service, etc.) are started in the plant and/or system. The notice shall be sent to the all related parties, defining the impending change in plant status with enough detail to enable clear understanding of the nature and location of the changes. Issuing the Commissioning Notice provides formal notification to all related parties. CONTRACTOR (s) Site HSE managers shall inform this Commissioning Notice to HSE staff (including night shift staff and medical team).

CONTRACTOR (s) shall obtain, as per agreed contract conditions, an authorization from the State Pollution Control Board as per Rule 6 of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 for handling, storage and disposal of hazardous waste generated during Construction, Pre-commissioning and Commissioning Phases of this project.

Waste effluent such as waste gas, chemical, oily water, etc. will be generated during commissioning. These waste effluents shall be controlled by CONTRACTOR (s) as per Owner / Consultant and legal requirements. Dust control shall be accomplished by proper housekeeping. Disposal of the chemical wastes shall be in accordance with the Owner / Consultant Specification and Legal Requirements. Permanent drainage system or temporary arrangement shall be ready for use prior to chemical/oil handling. Flare and oily sewer systems shall be in service prior to Hydro-Carbon Introduction

In case live drain system connect into a construction area drain system, segregation of the drain system between the construction area and Pre-commissioning and commissioning area is required to avoid flammable liquid / vapor leakage into the construction area.

During the commissioning and initial start-up phases unusual high sound pressure levels are generated

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by the activities, these would include such items as air and steam blowing, safety vent lifting, machinery runs without complete acoustic enclosures etc. Suitable protection shall be available and provided to the people expected to work in these effected areas.

12.2 Motor Solo Run / No Load Motor Run

Special precautions shall be taken by involving the supervision and direction of the electrical team.

- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Ensure that the area of the motor solo run shall be taped or barricaded. Suitable Warning Notice / Signs indicating “Equipment in Service – Keep Away” or “Test Runs in progress – Keep Away” shall be positioned to cover all points of access.
- Ensure that motor tests shall be monitored continuously and not be left unattended under any circumstances.
- Ensure licensed electrician, trained & competent personnel are only involved in the Electrical Activity.
- The Machinery is checked for the unguarded rotating part. & precaution taken to avoid any injury by guarding the same or barricading.
- Follow Permit to work system, LOTO Permit system is in place.
- Ensuring proper communication & coordination between the Field & the panel operators.
- Ensure that motor tests shall be monitored continuously and not be left unattended under any circumstances.
- Ensure that Motor Control Center must be controlled as per LOTO system.
- Ensure that the earthing of the machines are proper.
- Ensure that no loose clothing is used near Rotating parts.
- Follow all the instructions mention in manufacture’s guide.

12.3 Commission of the Pumps & Motors

- Follow Permit to work system.

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- Ensure only trained & experienced personnel are involved in the activity.
- Ensure the Checklist for pump commissioning is complete, such that guards are in place, interlocks are positioned, coupling is aligned etc.
- Ensure the energization of the system is done under competent person.
- Ensure the proper communication among field, control room and power substation. And Emergency controls are functional conditions etc.

12.4 Card Board Blasting & Air Blowing

Management of pressurized system and air blow discharge point are the most essential. Special precautions shall be taken.

- Follow Permit to work system.
- Barricade the exit blow out points and put a warning notice indicating “Air Blowing is in Progress – Keep Away”
- Barricade and put a warning sign around the pressurized area.
- Provide protection for facilities around discharge points.
- Ensure that hose couplings and any other temporary connection or pipe spool shall be properly secured.
- Confirm line and equipment being adequately supported
- Air blowing generates big noise near the blow point, so ear protection shall be worn by operator and persons working in vicinity.
- Ensure trained & experienced personnel are only involved in the Activity.
- Ensure that design pressure of line is checked and pressurization of line is maintained well below design pressure.
- The Air pressurization system is checked, for proper connection, pressure gauges, leakage from the flanges etc.
- The Card Board Blasting event is communicated using check/ clearance sheet.
- Ensure personnel are provided with Safety Helmet, Safety Shoes, Ear Plugs, Dust Mask, & Safety Goggles.
- During card board blasting, compressed gas will be suddenly released with high energy and foreign

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particles may come out along with gas, so special precaution to be taken care.

- All unwanted materials to be cleaned and all the temporary arrangement to be removed for original reinstatement after completion of the activity.

12.5 Water Flushing

Management of water discharge point is the most essential. Special precautions shall be taken.

- Follow Permit to work system.
- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Barricade the discharge points and put a warning notice indicating "Water flushing is in Progress – Keep Away"
- Provide cover or protection to equipment around discharge points.
- Proper positive isolation for other equipment and lines shall be ensured.
- Ensure that all electrical equipment, welding machines, temporary electrical supply systems etc. shall be covered or removed from the area.
- Ensure that sewer system or surface drains must be capable of disposing of the water to avoid any water build-up in the area.
- Ensure that soft soil shall be protected with planks or sheeting to minimize erosion.
- Ensure that hose couplings and any other temporary connection or pipe spool shall be properly secured.
- Drain the residue water and dry the line if required.
- Waste water / Waste disposal shall be as per legal requirements.
- Equipment/ materials below the flushing point shall be covered

12.6 Steam Blowing

CONTRACTOR (s) shall ensure following safety measures.

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- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Barricade the discharge points & put a warning notice as “Steam blow in Progress – Keep Out”.
- Open all drain valves on the steam header and/or steam traps to drain condensate until warming up completion.
- Provide permanent or temporary insulation at flange and pipe surface if required.
- Flow the steam slowly for warming up.
- Check line and shoes to avoid abnormal thermal expansion during warming up and steam blowing.
- Utilize silencer or silent blow system at the blowing point, if required.
- Ensure that no person is working in vicinity of the vents and drains during steam blowing operations.
- Proper positive isolation for other equipment's shall be ensured.
- Leak test of the system shall be conducted prior to charging of pressurized steam.
- Until the warming up all drains must be opened.
- Provide adequate pressure in lines.
- Provide minimum bends in pipes to minimize Water hammering.
- Ear protection shall be worn by operator and persons working in vicinity. Reduce the fluid velocity/ flow during venting.
- Ensure F- keys / Valve handle keys readily available to operate the valves.

12.7 Oil Flushing

Oil handling is the most essential. Special precautions shall be taken.

- Follow Permit to work system.
- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Barricade the area and put a warning notice indicating “Lube oil flushing in Progress – Keep Away
- Provide fire extinguishers.
- Prepare absorbent in case of oil spill.
- Waste oil will be stored in drum for safe disposal.
- Hot work to be restricted in nearby area.

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12.8 Lube Oil Charging

- Follow Permit to work system.
- Ensure trained & experienced personnel are only involved in the Activity.
- The charged system is properly marked
- Ensure the spillage & waste oil is collected & properly disposed.
- Hot work to be restricted in nearby area.

12.9 Large Diameter Pipe Manual Cleaning

- Follow Permit to work system.
- Apply Confined Space Entry Work Permit. Check O₂ concentration before and throughout the activities.
- Ensure that the pipe shall be adequately ventilated with atmospheric air. Fans or air movers shall be used.
- Ensure that a Safety Watcher shall be stationed at the entry point at all times in contact by radio with those entering.
- Ensure that internal means of safe access shall be provided to inspect vertical sections.
- Provide physical/positive isolation to avoid the unexpected introduction of nitrogen, hydro-carbon, etc. into the system from its adjacent system(s) where has been in service.
- Check temperature in the pipe.

12.10 Chemical handling and Cleaning

Characteristic of Chemical is the most essential. Special precautions shall be taken involving the supervision and direction of the commissioning department.

- Chemical shall be handled in according with MSDS instructions. Display MSDS at storage area.
- Train personnel for safe handling of chemicals.
- Barricade the area, display warning signs. Restrict unauthorized entry near chemical storage, tanks & chemical pump.
- Secondary containment shall be provided for chemical storage & handling systems.

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- Provide eye wash and emergency shower.
- Confirm line and equipment being adequately supported.
- Check all flanges, valves/ pipeline leakage shall be monitored.
- Leak test of the system shall be conducted prior to charging.
- Inspect temporary hoses & connections prior to use.
- Do not attend leakages without proper PPE. Wear PPE as per MSDS. Provide Spill Kit.
- Suitable type of fire extinguisher shall be provided.
- Ensure that chemical drainage system should be ready for use for spillage. Other adjacent drainage system where is not ready for use shall be plugged to prevent the system from contamination with the chemical. Provide temporary curved area if drainage system is not available.
- Stand-by absorber or counteragent.
- Establish emergency actions (emergency car, medical service, etc.).
- Disposal of the chemical wastes shall be in accordance with the Owner / Consultant Specification and Legal Requirements.

12.11 Loading of the Chemicals in the system

- Ensure the Availability of MSDS for each chemical to be handled.
- Ensure all personnel are aware of the chemical Hazards and trained in the Safety practices.
- Ensure Permit to Work System is followed.
- Ensure proper PPE are used by the personnel while handling the Chemicals.
- Ensure proper arrangements for the chemicals drum handling & transfer facility.
- Ensure Spill controls & exposure control arrangements are in place in the event of spillage.
- Ensure availability of Safety Shower & Eye wash.

12.12 Charging of the Heater (Electric Heater)

- Ensure trained & experienced personnel are only involved in the Activity.

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- Proper Permit to work system is implemented prior to commissioning the Heater.
- The Heater is charged under supervision in line with the manufactures / process Manual and The Stand by firefighting personnel is recommended.

12.13 Instrument Check (Loop/Function Test)

- Establish LOTO system for electrical safety control and isolate all circuits which should not be energized.
- Inform activities to all related parties in daily Tool Box Meeting.
- Record valve position requirement and control the position by specific person.

12.14 Rotating Machine Run

Risk of personnel injury and equipment damage will be extremely increased during rotating machine running. Special precautions shall be taken involving the supervision and direction of the commissioning department.

- Follow PTW.
- Inform hazards and area to all related parties in the Daily Tool box Meeting.
- Ensure that the rotating machine shall be completely assembled including the coupling guard.
- Ensure that all necessary documents and certificates shall be confirmed and approved by the Commissioning Group and Owner.
- Ensure that the area of the pump or compressor to be tested shall be taped or barricaded. Suitable Warning Notice / Signs indicating “Equipment in Service – Keep Out” or “Test Runs in progress – Keep Out” shall be positioned to cover all points of access.
- Ensure that the live line in the pump or compressor circuits shall be clearly identified with ‘Live Line’ notices and the test system shall be positively isolated from other sections of the plant.
- Ensure that machinery tests shall be monitored continuously and not be left unattended under any circumstances.
- Isolate motor/turbine properly from its power source after run.
- Ensure proper earthing to the equipment.

12.15 Proof Testing / Tightness Test

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High energy fluid is in the system during Tightness Test. Special precautions shall be taken involving the supervision and direction of the commissioning department.

- Follow PTW.
- Ensure that the required PPE should be worn.
- Ensure that suitable communication such as two way radios are ready for use.
- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Barricade the area and put a warning notice as “Tightness Test in Progress – Keep Out”.
- Line for testing is identified checked for the fittings, Joints, etc. secured at the ends and shall be clearly identified with ‘Live Line’ notices.
- Ensure that test system shall be isolated from other sections of the plant.
- Water once used for service testing it shall be disposed-off safely if necessary.
- Separate calibrated gauges to be provided for pressuring piping & equipment.
- Nip points of Pressure machine shall be guarded properly.
- The pressurization system is checked, for proper connection, pressure gauges etc.
- Flanges and fasteners of the recommended size and strength to withstand the test pressure used.
- Separate calibrated gauges provided for pressuring piping & equipment.
- Hoses shall be of proper rating, tested & certified.
- Ensure necessary precautions, stepwise increase in pressure.
- Close supervision and trained personal required for Proof Testing / Leak Testing jobs.
- The gas used as test fluid, if not air, shall be nonflammable and nontoxic.
- Ensure that depressurizing point must be surrounded with a barricade or caution tape, If the tightness test uses nitrogen as pressurization medium.
- Other activities in area shall be stopped during leak testing.

12.16 Nitrogen Introduction / Purging

Risk of asphyxiation will be extremely increased after Nitrogen Introduction. Special precautions shall be taken involving the supervision and direction of the commissioning department.

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- Inform hazards and area to all related parties in the daily Tool Box Meeting.
- Barricade the area and put a warning notice as “Nitrogen Purge in Progress – Keep Away
- Ensure that the N2 contained line shall be clearly identified with ‘Live Line’ notices.
- Ensure that Nitrogen Hose color coding is followed.
- Ensure that N2 purging and blanketing system shall be positively isolated by spade from other sections of the plant.
- Ensure that all construction work should be restricted as per work permit Procedure.
- Ensure that confined space entry permit shall be strictly controlled during/after inserting with N2.

12.17 Hydro-Carbon/Toxic Fluid Introduction

Potential Risk is extremely increased after Hydro-Carbon Introduction into the system because flammable explosive and/or toxic fluid exists in the system. The Commissioning Manager and the Site HSE Manager must confirm and agree that the system is safe and suitable to introduce hydro-carbon. Pre Startup Safety Review (PSSR) shall be conducted to ensure that the plant or system and facilities can proceed for start-up / initial operation of the plant or part of plant safely.

- Ensure that site-wide notice shall be issued explaining the hazards.
- Hold or reject all of work permit for non-related activities to the hydro-carbon introduction on the day. Only commissioning personnel are allowed to enter the site.
- Ensure that specific training and toolbox talks shall be conducted prior to gas Hydro-carbon introduction.
- Ensure that all systems which introduce hydro-carbon shall be suitably sectioned off and segregated using hard barriers/fences and signs with access restricted to approved personnel only.
- Ensure that fire and gas detection systems associated with the equipment shall be in service.
- Ensure that firefighting system shall be in service and equipment for emergency action are in place.
- Ensure that emergency response plan in place and emergency drill conducted.
- Ensure that site public address system shall be in service.
- Ensure that site safety rules regarding smoking shall be amended within the effected safety areas such that smoking is only allowed in specifically dedicated and tested locations.

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- Ensure that hot work permits shall be required for any potential ignition producing activities within the effected designated safety areas.
- Provide suitable PPEs.
- Ensure that the use/carrying of mobile phone shall not be allowed within the designated safety areas nor shall ignition materials such as lighters or matches.
- Ensure that use of vehicles and temporary generators shall be restricted and strictly controlled.
- Ensure that waste gas system (flare, vent stack, incinerator, etc.) and drainage system (oily water sewer, waste water treatment, etc.) shall be in service.

12.18 Toxic Fluid Case

- Ensure that Specific Toxic Gas Detection System shall be in service and fully operational.
- Ensure that personal multi gas detectors shall be worn by personnel working within high hazard areas.
- Ensure that toxic gas leak response plans shall be in place and fully operational.
- Ensure that training for the hazards of Specific Toxic Fluid and required alarm responses shall be provided to all personnel working within the designated safety areas.
- Ensure that wind socks, muster points, safety shelters shall be identified and available.
- Ensure that gas mask or air mask arrangement shall be considered.
- Ensure antidote / first aid measures suggested in MSDS are in place and people are trained for their use / application.

12.19 Feed intake in to the Plant

- Ensure all personnel trained in the Commissioning activity are only involved in the Job.
- Ensure system checks are complete and ready for commissioning.
- Ensure the electrical system, Instrumentation system interlocks are functional.
- Ensure the Pumps, motors are ready for operation and Utilities are commissioned.
- Ensure the internal of the equipment's are fixed and the systems are properly boxed up.
- Ensure valves are in open / closed condition to make the line through as per process requirements.
- The Feed intake shall be carried out under strict supervision of the Supervisor under proper permit to

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work system and in the presence of firefighting crew as standby for any eventualities.

12.20 System Commissioning Spade Isolation Requirements

Spades are applied to separate live systems from systems under construction or commissioning. Once hydro-carbon or nitrogen is introduced into the system, live systems shall be physically isolated from non-live system, and isolation points shall be strictly controlled. Isolation spades shall be controlled as per isolation procedure.

12.21 Central Control Room (CCR)

Access to CCR and the rooms where control systems are stored shall be limited and controlled by the Commissioning Manager. Personnel working in the CCR shall have taken the safety induction and any special training relating to the CCR building for emergency response and evacuation. Communications for both commissioning and operations shall use radio system compatible intrinsically safe equipment. Mobile phone use is not permitted in the CCR building to avoid any effects to control system. PTW shall be issued and authorized by the Commissioning Manager before starting the work in CCR and the rooms where equipment related to control system.

12.22 HVAC Room

HVAC system is important to protect equipment/computers such as DCS and electrical panel and comfortable work in the building. Access to HVAC Rooms shall be limited and controlled by HVAC representative. PTW for the HVAC is to be issued and authorized by the HVAC responsible personnel before starting the work in HVAC room. Personnel working in the HVAC Room shall have taken the safety induction and any special training relating to the HVAC for emergency action and evacuation.

12.23 Vehicle Control

All vehicles and engines entering in pre-commissioning & commissioning area shall be fitted with Indian standard complied spark arrester on all exhausts. All vehicles driven on site shall be maintained in roadworthy condition and be registered with the appropriate authority in accordance with the relevant laws and regulations. Vehicle shall have the RC book, valid fitness certificate, transport permit, PUC and Insurance document before entering into the site.

Each driver of these vehicles shall hold a valid driving license authorizing him / her to drive that class

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of vehicle and sufficient experience of driving. Only vehicles necessary during pre-commissioning & commissioning operation shall be permitted to enter the construction site. Motorcycles/three wheeler shall not be permitted. Driver to follow the speed limit e.g. below 20km/h within the site.

Practice preventive maintenance of vehicles and machines and maintain associated records and documents.

13. PENALTY

a) Any violation of applicable safety , health and environment related norms results in penalty of Rs. 5000/- per occasion. b) Violation as above resulting in any reportable physical injury, as per Indian Factory Act 1948, a penalty of 0.5% of the contract value (maximum of Rs. 2,00,000/-) per injury in addition to Rs.5000/- per occasion as in item (a).

Fatal accident, a penalty of 1% of the contract value (maximum of Rs.10,00,000/-) per injury in addition to Rs.5000/- per occasion as in item (a). The CONTRACTOR is advised to take appropriate insurance policy(ies) for covering the various penalties/payment deduction provisions in this regard.

In case of accidents, depending on the seriousness of injury etc., in addition to the hospitalization/ Treatment charges and Group insurance amount, compensation shall be paid by the CONTRACTOR to the affected person/ his family members in presence of Engineer-in-charge as per Workmen Compensation Act. This shall be in addition to any other compensation specified elsewhere in the Tender document in this regard.

The CONTRACTOR shall adhere consistently to all provisions of HSE requirements. In case of non-compliance or continuous failure in implementation of any of HSE provisions; Owner / Consultant may impose stoppage of work without any Cost and Time implication to OWNER and / or impose a suitable penalty for non – compliance with a notice of suitable period.

A detailed listed is attached in Appendix - 4

Owner/ Consultant shall have the right to deduct charges for any other unsafe act and or condition depending upon the gravity of the situation on a case-to-case basis.

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14. INCENTIVES / AWARDS

Contractor has developed a broad range of HSE incentive programs designed to motivate its employees and all working under them to maintain a high level of HSE performance. Contractor HSE recognition programs are administered at two levels. At company level through the designation of the 'Contractor of the Month' for the Sub-Contractor that has demonstrated the best safety performance over the previous month. At employees level through the designation of the employees/crews of the week.

Other ways to increase H&S awareness will include: Bulletin boards illustrating safe man-hours worked Employee Safety awards dinners Hard-hat decals for safe performance . CONTRACTOR hats and similar items given to top safety performers. In addition, CONTRACTOR construction and HSE management will randomly select individuals each week, and find where this person are working.

The person will be visited; if he is working safely (all PPE and similar) and can answer two simple HSE related questions then a small prize will be awarded. In addition, the supervisor of each person will also receive an award. If the person is not working safely or cannot answer the questions, then he and his supervisor will be educated and positively reinforced but no award made.

15. SOCIAL ACCOUNTABILITY (CORPORATE SOCIAL RESPONSIBILITY)

The CONTRACTOR shall comply Social Accountability that protect Human Rights, and aims to develop, to monitor and to encourage a policy of protection of Workers' Rights. It defines precise requirements regarding the following themes:

- Child Labor
- Forced Labor
- Health and Safety
- Freedom of Association and Right to Collective Bargaining
- Discrimination
- Disciplinary Practices
- Working hours

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- Remuneration

16. DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR

16.1 On Award Of Contract

The CONTRACTOR shall submit a comprehensive Health, Safety and Environment Plan or program for approval by Owner/ Consultant prior to start of work. The CONTRACTOR shall participate in the pre-start meeting with Owner/ Consultant to finalize HSE Plans which shall including the following:

- HSE policy & Objectives
- Job procedure to be followed by the CONTRACTOR for construction activities including handling of equipment, scaffolding, electric installations, etc. describing the risks involved, actions to be taken and methodology for monitoring each activity. Indicative list of procedures
- Owner/ Consultant review/audit requirement.
- Organization structure along with responsibility and authority, on HSE activities.
- Administrative & disciplinary steps involving implementation of HSE requirements
- 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 Inspection
- HSE Training Programs at project site
- HSE Awareness Programs, at project site
- Reference to Rules, Regulations and statutory requirements.
- HSE documentation viz reporting, analysis & record keeping.

16.2 During Job Execution

CONTRACTOR shall implement approved Health, Safety and Environment management program. CONTRACTOR shall also ensure the following :

To arrange workmen compensation insurance, registration under ESI Act, third party liability insurance, registration under BOCW Act, etc, as applicable.

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To arrange all HSE permits before start of activities (as applicable), like permits for hot work, working at heights, confined space, Radiation Work Permit, Demolishing/ Dismantling Work Permit, Permit for erection/modification & dismantling of scaffolding, Permit for heavy lift/critical erection, Permit for energy Isolation & De-isolation", 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. List of the persons involved shall be maintained as annexure to the work permit issued for a particular activity.

To submit, timely, the completed checklist on HSE activities, Monthly HSE report (as attached) is compulsory wherever the facility is available else a hard copy is to be submitted), accident/ incident reports, investigation reports etc. as per Owner/ Consultant requirements.

Compliance of instructions on HSE shall be done by CONTRACTOR and informed urgently to Owner/ Consultant. that his top most executive at site attends all the Safety Committee/HSE meetings arranged by Owner/ Consultant and carries out safety walk through regularly. Only in case of his absence from site that a second senior most person shall be nominated by him, in advance, and communicated to Owner/ Consultant for performing the above tasks.

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, various do's & don'ts,

Provide posters, banners for safe working to promote safety consciousness.

Identify, assess, analyze & mitigate the construction hazards & incorporate relevant control measures before actually executing site works. (HIRAC = Hazard Identification, Risk Analysis and Control).

Arrange testing, examination, inspection of own as well as borrowed construction equipment machinery (stationary & mobile) before being used at site and also at periodical interval, through own resources and also by 3rd party competent agencies (as deemed fit in statutes). Records of such test, examination etc. shall be maintained & shall be submitted to Owner/ Consultant as & when asked for.

Carryout audits/inspection (internal & external) at his works as well as sub-CONTRACTOR works as per approved HSE plan/procedure/program & submit the compliance reports of identified shortfalls for

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Owner/ Consultant review.

Arranging HSE training for site workmen (of his own & sub-CONTRACTORs) through internal or external faculty at periodical intervals. Assistance & cooperate during HSE audits by Owner/ Consultant or any other 3rd party and submit compliance report.

Generate & submit of HSE records/report as per this specification. apprise Owner/ Consultant on HSE activities at site regularly. Carry-out all dismantling activities safely, with prior approval of Owner/ Consultant representative.

The CONTRACTOR shall ensure that “Hot works” and painting works do not continue at the same place / location at project site for which chance or probability of “fire” incident exists.

16.3 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.

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APPENDIX

1. DETAILS OF FIRST AID BOX

Appendix : 1

S.No	DESCRIPTION	QUANTITY
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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 Savlon		1	Bottle
7.	Mercurochrome 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.

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26.	Duster	1	No.
27.	Booklet (English & Local Language)	1	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		

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 : 2

2. LIST OF STATUTORY ACTS & RULES RELATING TO HSE (Latest Version)

- The Indian Explosives Act and Rules
- The Motor Vehicle Act and Central Motor Vehicle Rules

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- 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 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 BOCW (Regulation of Employment and Condition of service) Act
- The E-waste (Management and Handling) Rules,
- The Bio-Medical Waste (Management and Handling) Rules
- The Plastic Waste Management Rules
- Other statutory acts Like EPF, ESIS, Minimum Wage Act.

3. TRAINING SUBJECTS / TOPICS

Appendix : 3

(For Contractors' personnel)

- The Law & Safety – Statutory Requirement / Applicable statutes / Duties of employer / employee

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- Policy & Administration – Why HSE? / Duties & Responsibilities of Safety Personnel at project site / Effect of incentive on accident prevention
- HSE & Supervision – Duties of Supervisor / HSE integrated supervision / Who should be held responsible for site accidents?
- Safety Budget / Cost of Accidents – Direct costs / Indirect costs
- Hazard Identification / Type of hazards / HIRAC
- Behavioral Safety & Motivation
- Housekeeping – Storage / Stacking / Handling of materials / Hydra handling
- Occupational Health in Construction sector
- Personal Protective Equipment – Respiratory & Non- respiratory
- Electricity & Safety – ELCB / Fuse / Powered tools / Project illumination
- Handling of Compressed Gas – Transportation / Storage / FBAs / Fire prevention
- Machine Safety – Machine guarding / Maintenance
- Transportation – Hazards & risks in transp. of materials / ODC consignments
- Cranes & Other Lifting machinery – Legal requirements vis-à-vis essential safety requirements.
- Communication – HSE Induction / TBTs / Safety Committee / Safety meeting / Propaganda/Publicity.
- Excavation – Risks & Dangers / Safety measures
- Working at Heights – Use of ladder / Work on roofs / Scaffolds / Double harness lanyard
- Life savings. Safety Nets / Floor openings / line / Fall arrest
- Hazards in Welding & important safety precautions and Gas Cutting

4. PENALTY TABLE

Appendix : 4

S.No	Violation of HSE norms	Penalty amount
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1	For not using PPE (helmet, shoe, goggles, gloves, full body harness, face shield and boiler suit etc...)	Verbal warning 2 times and then Rs 250 per day/item/person
2	Working without work permit/ clearance	Rs 5000 / per occasion
3	Unsafe electrical practice (not using ELCB, using poor joints of cable, using naked wire without plug top into socket, laying wire /cables on the roads, electrical jobs by incompetent person,etc)	Rs 3000 per item per day
4	Working at height without full body harness using nonstandard / rejected scaffolding and not arranging fall protection arrangement as required like safety net	Rs 3000 per case per day
5	Unsafe handling of compressed gas cylinders(No trolley, jubilee clip double gauge regulator, improper storage/handling)	Rs 100 per time per day
6	Use of domestic LPG for cutting purpose	Rs 1000 / per occasion
7	No fencing/barricading of excavated area.	Rs 1000 / per occasion
8	Not providing shoring/strutting/proper slope and not keeping the excavated earth at least 1.5 m away from excavated area.	Rs 5000 / per occasion
9	Non display of caution board, list of hospital, emergency service available at work location.	Rs 500
10	Traffic rules violation like over speeding of vehicle, rash driving, wrong parking, not using seat belt, vehicles not fitted with reverse warning alarm.	Rs 1000 / per occasion
11	Absence of CONTRACTORS top most executive at site in the safety meeting whenever called by Owner / Consultant.	Rs 5000 / per meeting
12	Failure to maintain safety record by CONTRACTOR safety personnel	Rs1000 / per month
13	Failure to conduct daily site safety inspection HSE meeting and audit at predefined frequencies	Rs 1000 / per occasion
14	Failure to submit the monthly HSE report by 5 th of subsequent month to engineer in charge	Rs5000 / per occasion

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		Rs 100 / per day for further delay.
15	Poor house keeping	Rs1000 / per occasion
16	Failure to report & follow up accident (including near miss) reporting system.	Rs10000 / per occasion
17	Degradation of environment (not confirming toxic spill, spilling oil/lubricants onto ground)	Rs1000 / per occasion
18	Not medically examining the workers before allowing them to work at height, not providing ear muff while allowing them to work in n noise polluted area, made them to work in air polluted area without respiratory protective device etc.	Rs1000 / per occasion
19	Violation of any other safety condition as per job HSE plan, work permit and HSE condition of contract(using crow bar on cable trench, improper welding booth, not keeping fire extinguisher ready to at work site, unsafe rigging practice, non-availability of first Aid box etc....)	Rs 1000 / per occasion
20	Violation of applicable Safety, health and Environment related norm, a price reduction of	Rs. 5000/- Per occasion
21	Any Physical injury, a price reduction of 0.5% of the lumpsum Price / Maximum of	Rs. 2,00,000/- Per injury in addition to Rs. 5000/-
22	Fatal accident, a price reduction of 1% of the contract value	Maximum of Rs. 10,00,000 / per fatality in addition to Rs. 5,000/-
23	Any violation not covered above	To be decided by Owner / Consultant

5. ON-SITE HSE ACTIVITIES PROGRAM (TYPICAL)

Appendix : 5

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ITEM	FREQUENCY	REMARKS
1) HSE Meetings		
HSE Steering Committee Meeting	Monthly & as required	High Mgmt (Site and/or office) and HSE Mgrs of CONTRACTOR and Owner / Consultant
Weekly Subcon's' HSE Meeting	Weekly	HSE Mgmt. of Subcon's, Contactor and Owner / Consultant. Every 4 weeks Site Mgmt of Subcons', CONTRACTOR and Owner / Consultant are invited also
Weekly Mgmt CONTRACTOR & Owner / Consultant meeting	Weekly	Attendance of HSE Mgrs in the weekly Mgmt CONTRACTOR and Owner / Consultant meeting
Weekly CONTRACTOR Mgmt Meeting	Weekly	Attendance of HSE M in the weekly CONTRACTOR Mgmt Meeting
Weekly Construction / Commissioning Meetings by area	Weekly	Attendance of area CONTRACTOR and Subcontractors HSE Spdt / Mgr. in the weekly Construction Meeting by area
CONTRACTOR HSE Dept. meeting	Every 2 weeks	All CONTRACTOR HSE Dept. members
Task Instructions	Daily	Supervisors, Foremen, Workers, HSE SVs
2) HSE Training		
HSE Induction Training	Daily or as required	for all new entrants
CONTRACTOR PULSE Program	Continuous	for all employees
ITEM	FREQUENCY	REMARKS

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HSE personnel specific training + Final written test (eliminator) + On job training	Immediately as required	For all CONTRACTOR and Sub CONTRACTORs new HSE personnel entrants
All Site specific HSE Training modules	As per weekly HSE training schedule	for all employees depending of their job and work specificities
First-aid Training	Yearly for each trainee	All Sub CONTRACTORs and CONTRACTOR HSE personnel + Security Supervisors & Managers
Specific HSE trainings (by external training organisms)	As required	Eg. rescue at height, firefighters, car demarcation, gas testers calibration, etc.
3) HSE Inspection and Audit		
Equipment (type?) Inspection	At bringing onto Site	by Sub-CONTRACTOR's' inspectors
	Monthly/Periodic	by Sub-CONTRACTOR's'/suppliers' inspectors
Equipment Pre-use Inspection	Daily	by operators/users of equipment/facilities
General HSE Inspection	Daily and as required	by CONTRACTOR's supervisors/foremen/HSE staff
LPI System (loss prevention inspections)	Weekly	by CM, Const. SVs, and others assigned HSE CONTRACTOR's staff
Weekly areas walkthroughs and weekly management Site walkthrough	Weekly	By sub-CONTRACTORs / CONTRACTOR / Owner / Consultant Mgrs and HSE staff
Weekly welfare inspections	Weekly	By sub-CONTRACTORs / CONTRACTOR Admin, Safety, Environment and Medical staff

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External HSE Audit of CONTRACTOR/ Sub - CONTRACTOR	Yearly	by CONTRACTOR HSE Committee & HSE MO
Internal HSE Audit of Sub-CONTRACTORs	Every six months	by CONTRACTOR HSE specific personnel
4) Work Permit	Daily or as required	for all work required locations by PTW system
5) Sanitation & Health Service		
Physical Examination	As required	for employees involved in health hazards
Potable Water Test	Monthly	Quality test by authorized laboratory
-Camps, Kitchen & Toilets	Monthly	Camp Manager, HSE SVs
Site Toilets	Weekly or as required	HSE SVs
6) HSE Reporting		
Incident / Accident Notifications	Immediate and as per procedure	from CONTRACTOR HSE M to SM and Owner / Consultant
Daily HSE Report	Daily	from CONTRACTOR HSE SVs to HSE M
Weekly HSE Report	Weekly	- from Sub CONTRACTORs to CONTRACTOR HSE M and - from CONTRACTOR HSE M to Owner / Consultant and to CONTRACTOR Project
Weekly Welfare Inspections Report	Weekly	From CONTRACTOR Admin. Department to SM and HSE M
Training Report	Weekly	from CONTRACTOR Trainer Coordinator to HSE M
Monthly HSE Report	Monthly	from CONTRACTOR HSE M to PM and HSE MO
Monthly HSE Equipment Inspection Report	Monthly	from Inspectors to HSE M & CMs

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HSE Audit Report	As required	from auditors to PM, SM & HSE MO
7) Housekeeping		
Work Site areas	Daily	by every work crew after day's work
Common Site areas (eg. Roads)	Weekly	by designated personnel
Waste disposal	As required	by designated teams

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6. TYPICAL TRAINING MATRIX

Appendix : 6

SITE HSE TRAINING MATRIX - TYPICAL

ATTENDANTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	SITE / CAMP INDUCT	SEW (MSJHA)/ PTW (TBM) BBB	PTW - TEST	ALL BBB - OUT	FALLS PROTEC -TEST & EXERC.	SITE STRUCT TAGS & GRATING REMOV	CONF SPACE ENTRY	SUPER OTHER SWP	GENERAL SITE AWARE NESS	SAFE DRIVING - SECURIT Y & TRAFFIC	LOTO	PC/C INDUCT.	ENV	PULBE LEADER	PULBE SITE SUPERV.
PROJECT MANAGEMENT	V											V		V	
SITE MANAGER	V				V			V	V			V	V	V	
CONSTRUCTION MANAGERS	V	V			V	V	V	V	V	V	V	V	V	V	
MANAGEMENT STAFF	V	V		V	V	V	V	V	V	V	V	V	V	V	
SUPERVISION STAFF	V	V		V	V	V	V	V	V	V	V	V	V		V
EMERG. TEAM / FF / FA / RE	V				V	V	V		V**			V	V		
MEDICAL STAFF	V				V	V	V		V			V	V		
SECURITY	V									V*		V			
HSE PERSONNEL	V	V	V	V	V	V	V	V	V	V	V	V	V		
PTW KEY ROLES			V								V	V			
BBB TASK FORCE				V							V	V			
DRIVERS AND FLAGMAN	V									V		V			
SUPERVISORS (ALL)	V	V			V	V	V	V	V	V	V	V	V		V
FOREMAN (ALL)	V	V			V	V	V	V	V	V	V	V	V		V
ALL LABOUR (at least to be controlled by us)	V											V			

- 8: ELECTRICAL SAFETY - RIGGING / LIFTING / HOISTING – EXCAVATION - MOBILE INDUSTRIAL EQUIPMENTS - HOT WORKS
- 9: GENERAL SITE HAZARDS (WEATHER CONDITIONS, LIVE PLANTS AREAS, ETC.) EMERGENCY TASKS – FIRE FIGHTING – FIRST AID – CHEMICALS
- 12: General PC/C induction to all the site personnel. More deep and specific induction to all the employees directly involved in PC/C activities is needed
- (*) Means – Training in any case to be dedicated to: Emergency Team Staff, Security Staff, those which shall work in Confined Space

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CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES APPENDIX : 7

ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
(A) EXCAVATION Pit Excavation upto 3.0m	Falling into pit	Personal injury	Provide guard rails/ barricade with warning signal Provide at least two entries/ exits. Provide escape ladders.
	Earth Collapse	Suffocation/ Breathlessness Buried	Provide suitable size of shoring and strutting, if required. Keep soil heaps away from the edge equivalent to 1.2m or depth of pit whichever is more. Don't allow vehicles to operate too close to excavated areas. Maintain at least 2m distance from edge of cut. Maintain sufficient angle of repose. Provide slope not less than 1:1 and suitable bench of 0.5m width at every 1.5m depth of excavation in all soils except hard rock. Battering/benching the sides.
	Contact with buried electric cables Gas/ Oil Pipelines	Electrocution Explosion	Obtain permission from competent authorities, prior to excavation, if required. Locate the position of buried utilities by referring to plant drawings. Start digging manually to locate the exact position of buried utilities and thereafter use mechanical means.
Pit Excavation beyond 3.0m	Same as above Flooding due to excessive rain/ underground water	Can cause drowning situation	Prevent ingress of water Provide ring buoys Identify and provide suitable size dewatering pump or well point system
	Digging in the vicinity of existing Building/ Structure	Building/Structure may collapse Loss of health & wealth	Obtain prior approval of excavation method from local authorities. Use under-pining method Construct retaining wall side by side.
	Movement of vehicles/ equipment's close to the edge of cut.	May cause cave-in or slides. Persons may get buried.	Barricade the excavated area with proper lighting arrangements Maintain at least 2m distance from edge of cut and use stop blocks to prevent over-run Strengthen shoring and strutting

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Appendix : 8

LOTO AND SCAFFOLDING TAGS

[TYPICAL TAG OUT – SCAFFOLDING TAGS
 LOCK-OUT - Electrical ⚡ – Other (without sign)
 Plasticized double face signs with metal rings: 15 x 10

					
DANGER					
					
DO NOT OPERATE					

					
ITEM	WP ID	DATE	NAME	KEY ID	SIGNATURE

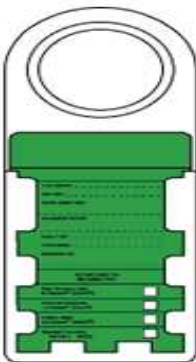
SCAFFOLDING TAGS



**Scaffold
Unsafe
Empty Card
Holder**



**Scaffold
Inspection
Back of Card
Signed and Dated**



**Scaffold
complete and
in use. Front of
Card Showing**

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Appendix : 9

HSE REPORTING FORMAT

Monthly HSE Statistics									
Project Name & No.:									
Month:									
S/No	Description	Up to Previous month(X) PTD		Sub-contractor (A)		Sub-contractor (B)		Total This Month (A+B)	CONTRACTOR Project Staff
Type of Contractor*		Sailed	Unkilled	Sailed	Unkilled	Sailed	Unkilled		
MAN HOURS									
1.	Total Man Days								
2.	Total Man hours worked								
LAGGING INDICATORS									
3.	First Aid cases								
4.	Near Miss								
5.	RWC								
6.	MTI/ MTC								
7.	Loss Time Injury (LTI)								
8.	Fatal								
9.	Lost Work Days (LWD)								
10.	Environment Incident								
10.	Severity Rate (LWD X 200000/Total Mnh)								
11.	Frequency Rate (LTI X 200000/Total Mnh)								
12.	TRC								
13.	TRFC (TRC X 200000/Total Mnh)								
LEADING INDICATORS									
14.	SOC / SDS Observations (No. of Safe / Hazard observed / recorded)								
15.	No. of Closed Hazard (No. of actions generated / Recorded)								
16.	Leadership Visit *								
17.	Management Walk Through *								
18.	Safety Committee Meeting conducted at site.								
19.	Emergency / Mock Drill								
20.	Safety awareness programme conducted at site								
21.	Pre employment medical check up.								
22.	Training hours.								
23.	Site inspections / Walkthrough								
24.	Site Induction Training								
25.	HSE Audits (External / Internal)								
26.	Number of JSA / Risk Assessment Performed								
27.	Other Safety activity.								
HSE Manager APPROVALS & COMMENTS:									
*Leadership Visit - Visit by Management Committee Member, M/R Group Directors /VP.									
*Management Walkthrough - Visit by Sr. Official Other than Management Committee Member & M/R.									
LTI=Lost Time Incident		LWD=Lost Work Days		JSA = Job Safety Analysis		MTD = Medical Treatment Case			
PTD= Project to Date		MTI = Medical Treatment Incident		No. = Number					
NWD = Restricted Work Case		SOC = Safety Observation Card		FFRD = Total Recordable Case Frequency					
TRD = Total Recordable Case		SDS = Behaviour Based Safety		HSE = Health Safety & Environment					

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MINUTES OF MEETING FORMAT

Appendix : 10

WEEKLY HSE MEETING REPORT – DRAFT

(all personnel attended this meeting must sign the back of this report)

Project		Date	
Site		Meeting Time	

AGENDA	
1)	4)
2)	5)
3)	*) Other

GENERAL

REPORT
1)
2)

ACTION PLAN

Item	Topics	Action to Improve	Responsible / Subcontractor	Targeted Date
1				
2				
3				

SEND IT TO	
Site Manager / Construction Managers / HSE Manager	Subcontractors Field Manager / HSE Representatives
All the Superintendents South	Others

REGISTRATION FORM – SHEET N° _____

N	Roles	Company	Name and Surname	Signature
1				
2				

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INCIDENT REPORTING FORMAT

Appendix : 11

INCIDENT REPORT			
1. GENERAL INFO			
TYPE OF REPORT *	☐ Preliminary	☐ Final	
CASE TYPE *	☐ Accident	☐ Near Miss	
INCIDENT OWNERSHIP*	☐ Company Incident	☐ CONTRACTOR Incident	
INCIDENT TYPE *	☐ Work related	☐ Non-work related	
REPORTING ENTITY	Please select		
PERSON IN CHARGE			
2. FACTS			
DATE*		TIME (HH: mm) *	
LOCATION*		PROJECT NUMBER / NAME *	
OWNER*		RESPONSIBLE REPORTING CENTER	
INCIDENT CATEGORISATION	Access / Egress	AUTHORITIES INFORMED	☐ YES ☐ NO If Yes, who?
DESCRIPTION OF THE INCIDENT*			

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3. CLASSIFICATION			
WORK ACTIVITY *			
ACTIVITY *			
CONTRACTOR / SUBCONTRACTOR INVOLVED			
ACTUAL LOST*		☐ Harm to people (proceed to 3.1) ☐ Environment (proceed to 3.2) ☐ Fire / Explosion (proceed to 3.3) ☐ Occupational Illness (proceed to 3.4) ☐ Equipment damage ☐ Project Schedule Impact	
3.1 - HARM TO PEOPLE			
COURSE OF EVENT	Please select	GENDER	Please select
TYPE OF INJURY*		AGE	
PART OF BODY HARMED*		EXPERIENCE IN POSITION (days)	
POSITION*		EXPERIENCE ON INSTALLATION /SITE (mths)	
EMPLOYMENT CATEGORY	Please select	SHIFT	Please select
COMPANY*		DAYS INTO TOUR	
FOR LTI / RWC* (Estimate days lost)		HOURS INTO SHIFT	
3.2 - ENVIRONMENT			
ENVIRONMENTAL DOMAIN *	Please select	VOLUME (litres) *	
SUBSTANCE TYPE *	Aviation fuel (litres)	DURATION (min) *	

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ENVIRONMENTAL INCIDENT CLASSIFICATION *	Please select		
DESCRIPTION *			
3.3 – FIRE / EXPLOSION			
FIRE TYPE *	Please select	PRIMARY SYSTEM	EXTINGUISHING
IGNITION SOURCES		VOLUME USED	
DESCRIPTION			
3.4 – OCCUPATIONAL ILLNESS			
SEVERITY OF ILLNESS*	Please select	☐ Exposure in present employment	
AGENT / INFLUENCE		☐ Exposure in previous employment	
TYPE OF ILLNESS		☐ Form completed	
ORGAN SYSTEM		☐ Authorities notified	
SEX	Please select	AGE	
POSITION		COMPANY	Please select
EMPLOYMENT CATEGORY		ORGANISATION	
4. LOSS POTENTIAL *			
POTENTIAL RECURRENCE/SEVERITY		POTENTIAL RISK	
Potential recurrence: ☐ A ☐ B ☐ C ☐ D ☐ E		☐ R Low (1-8) ☐ R Medium (16-32) ☐ R High (64-256)	
Severity: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5			
FOLLOWING INCIDENTS HAVE TO BE IMMEDIATELY COMMUNICATED TO HEAD OFFICE			
☐ Major Incident	☐ High Potential Incidents (= 64)	☐ LTI	

IMMEDIATE CAUSES – Report immediate causes at first instance. Consult the following list and describe more as needed. Check below which causes best indicate reason for existence of acts and/or conditions identified. Add other causes if not listed. Why it happened? – Which condition was under-standard? - Generally more than one.

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	PEOPLE		ORGANIZATION
☐ 1P	Bypassed control / defense	☐ 18O	Inadequate permit / not following permit
☐ 2P	Disabled / removed guard / warning system / safety device / shortcut	☐ 19O	Poor job plan
☐ 3P	Failure to act		ENVIRONMENT
☐ 4P	Failure to obey / see safety systems / controls / barriers	☐ 20E	Exposure to extreme / unexpected weather
☐ 5P	Failure to secure	☐ 21E	Exposure to extreme temperature / humidity / dust
☐ 6P	Inadequate pre-task checking	☐ 22E	Exposure to hazardous atmosphere
☐ 7P	Inappropriate manual handling / use of equipment / tools	☐ 23E	Inadequate ventilation / light / illumination
☐ 8P	Inappropriate position of person(s)	☐ 24E	Natural effects (flooding, landslides etc)
☐ 9P	Incorrect loading / stacking	☐ 25E	Slippery or uneven surface / obstruction etc
☐ 10P	Lapse, mistake, omission	☐ 26E	Unprotected height risk
☐ 11P	Operated without authority / permission		TECHNOLOGY
☐ 12P	Operating equipment / vehicle at improper speed etc	☐ 27T	Exposure to hazards e.g. fire, chemical, noise etc
☐ 13P	Slips, trips, falls	☐ 28T	Falling / incorrectly placed objects / materials
☐ 14P	Under influence of alcohol / drugs	☐ 29T	Improper loading / storing / positioning of material / equipment
☐ 15P	Unsafe / inappropriate act / horseplay	☐ 30T	Ineffective guards / warning systems / safety device / PPE etc
☐ 16P	Used faulty / defective tools / equipment	☐ 31T	Leakage (fuel, radiation, chemical, gas) etc
☐ 17P	Worked on equipment in operation / live	☐ 32T	Plant / equipment status was not correct
		☐ 33T	Technical / mechanical failure / faulty equipment etc
		☐ 34T	Undetected / unforeseen hazard / failure

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Immediate CAUSES - Report the immediate causes and describe more if needed			
6. UNDERLYING CAUSES – Which specific human factor or work factor have led to immediate causes (at least one for each immediate cause)? – Why that act or condition was present? - The root causes shall be removed by an action plan.			
	PEOPLE		ORGANISATION
☐ P1	Deliberate infringement / violation / action	☐ O24	Conflicting objectives / goals / standards
☐ P2	Extreme work demands / fatigue	☐ O25	Financial, resource constraints / purchasing / procurement
☐ P3	Followed usual custom & practice	☐ O26	Inadequacies in shift handover
☐ P4	Illness / injury	☐ O27	Inadequate correction of prior hazard / incident / condition
☐ P5	Inadequate reaction to changing circumstances	☐ O28	Inadequate leader knowledge, ability/supervise./decision
☐ P6	Lack of attention / due care / poor work practice	☐ O29	Inadequate planning / risk assessment
☐ P7	Lack of awareness / perception of risk	☐ O30	Inadequate safety controls / warning systems / signs
☐ P8	Lack of knowledge of task / procedure / permit	☐ O31	Inadequate training / guidance provision / qualifications
☐ P9	Lack of skill / knowledge / experience / training	☐ O32	Inadequate work planning / programming
☐ P10	Miscommunication / inadequate communication of instructions	☐ O33	Ineffective auditing / inspection / monitoring
☐ P11	Not following / incorrect following of standards / procedures	☐ O34	Ineffective identification of hazards
☐ P12	Not using / incorrect use of PPE	☐ O35	Ineffective management of change
☐ P13	Physical / mental capability / stress problems / fatigue	☐ O36	Ineffective standards/enforced/procedures/guidelines/ instruct.
☐ P14	Poor decision-making / judgment	☐ O37	Lack of / ineffective job plans (toolbox talks etc) / ptw
☐ P15	Poor team relationships / dynamics / tensions (social / cultural)	☐ O38	Lack of accountability / responsibility

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	TECHNOLOGY	☐ O39	Lack of means of communication
☐ T16	Design deficiencies	☐ O40	Missing or inadequate job safety analysis
☐ T17	Excessive wear & tear of tools / equipment	☐ O41	Poorly controlled CONTRACTORS / external people
☐ T18	Improper identification of hazardous materials	☐ O42	Security breach
☐ T19	Improperly prepared tools / equipment	☐ O43	Unclear / conflicting lines of responsibility
☐ T20	Inappropriate equipment / vehicle for not fit for purpose		ENVIRONMENT
☐ T21	Ineffective adjustment / repair / maintenance	☐ E45	Inappropriate construction / layout
☐ T22	Ineffective fire / explosion / radiation / chemical / electrical protection	☐ E46	Insufficient / restricted access & exits
☐ T23	Lack of correct tools / equipment / power	☐ E47	Poor housekeeping / disorder
Underlying CAUSES - Report the Underlying causes and describe more if needed			
7. ROOT CAUSES – Report the Root Causes selecting the basic categorization and detailing describing the root causes identified during the investigation.			
☐ P	People	☐ O	Organization
☐ T	Technology	☐ E	Environment
Root CAUSES - Report the Root causes and describe more if needed			
8. CORRECTIVE ACTIONS – Report identified actions to remove root causes and prevent recurrence – Use the following guideline as needed. Report in sequence of priority. Assign a target time and person/company responsible to complete the corrective action and give fee-back of completion. Try to be S.M.A.R.T (Specific, Measurable, Achievable, Realistic, Timed)			

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CORRECTIVE ACTION PLAN		TO BE EXECUTED BY	DUE-DATE

9. ATTACHMENTS - Photos, Witnesses statement, Medical report, Other					
N O	TITLE	DOCUMENT NAME			
1					
2					
3					
10. APPROVAL					
REV.	DATE	STATUS	WRITTEN BY (name)	CHECKED BY (name)	APPROVED BY (name)

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Appendix : 12

WEEKLY HSE WALK AROUND REPORT

| WEEKLY HSE WALK AROUND REPORT

(all personnel attended this survey must sign the back of this report)

Site		Date	
Area visited		Time of survey	
SUMMARY			
Involve People / Discuss with the Workers / Ask Open Questions / Communication	Verify Safe Behaviour / PPE / Tools and Equipment	Method of Work / Risk Management	
Work procedure: Job Hazard Analysis, Permit To Work, Working at height, etc.	Emergency and Fire Fighting preparation and response	Housekeeping and Environmental	

GENERAL OBSERVATION

SAFE ACTIVITIES OBSERVED / REINFORCED

UNSAFE ACTIVITIES OBSERVED / CORRECTION DONE / FURTHER ACTION TO DO TO PREVENT

SEND IT TO

Owner Project Managers	Construction Contractors Field Manager / Safety
Site Manager / Construction Manager / HSE Manager	Others
All the Superintendent	

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WEEKLY HSE TRAINING / TOOL BOX MEETING

WEEKLY HSE TRAINING MEETING / TOOL BOX MEETING (all personnel attended this meeting must sign the back of this report)		
SUBCONTRACTOR	COORDINATOR	DATE DAY XX/YY/ZZ
TIME START	TIME END	SITE PLACE
GENERAL JOBS ON GOING OR TO BE CARRIED OUT SOON.....		
CRITICAL ACTIVITIES.....		
JHA / HSE WORK PRACTICES TO BE ADOPTED		
ACTION TAKEN MORE OVER THE JHA / HSE WORK PRACTICES AFTER DISCUSSION.		
SAFE WORK PRACTICE REMARKS.....		
ANALYSIS OF THE MOST COMMON VIOLATION		
MEDICAL CASES - INCIDENT/ACCIDENT DISCUSSED.....		
QUESTION / RACCOMENDATION / SUGGESTION.....		
OTHER.....		
(Tool Box Meeting to be recorded by Subcontractor – Weekly HSE Meeting to be sent to SHSEM)		
NOTE BY THE SHSEM.....		

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JOB HAZARDS ANALYSIS (JHA)

JHA DRAFT

PROJECT XXXX –		
JOB HAZARD ANALYSIS		Rev. 0 Page

COMPANY	AREA
JOB	DATE OF ANALYSIS
NUMBER OF JHA	TOTAL NUMBER OF JHA
BRIEF DESCRIPTION AND CONSIDERATION (Scope, Place, Resource, Equipments, Conditions nearby, etc.)	

STEP	HAZARD	PREVENTIVE MEASURE

ISSUED	CHECKED	DATE
Subcontractor Line Supervision	Subcontractor responsible	

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PRE-EMPLOYMENT MEDICAL FITNESS

A. For CONTRACTOR's & Sub- CONTRACTORs Employees

PRE-ASSIGNMENT MEDICAL EXAMINATION RECOMMENDATION (GL 12109)

The basic recommended tests depend on the age of the employee:

a) Up to age 40:

Exams = Physical examination + dental examination

Other exams = Eyes tests + Audiogram + Chest X-Ray (< 3 months) + ECG + Spirometry

Tests = Blood test = FBC/CBC – Fasting blood sugar + HbA1 + Blood group + liver, gastric (lipid profile) and renal functions blood tests + ESR/CRP

Urine analysis

b) 40 to 50: idem +:

= Stress ECG – depending on risk factor and ECG

= Blood test = Uric acid

c) Above age 50: idem 40 to 50 +:

= Stress ECG/Echocardiogram

d) Specific tests can be added, due to specific tasks. Examples of specific tests are:

= Food handlers: stool analysis...

= Noise exposed workers: audiometric test...

= Dust exposure: spirometry, etc...

A copy of the medical record should be given by each Client and Contractor personnel arriving onsite to the on-site doctor.

Examining doctor will issue a medical fitness certificate to the candidate. If any abnormality is observed, it shall be clearly mentioned in fitness certificate. The copy of medical fitness certificate along with reports will be kept at the site.

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N.B. In case of abnormal finding, in consultation with OHA, he will be referred to concerned specialist for his opinion and / or further investigations like USG, TMT etc.

B. Fitness Criteria

To declare the candidate fit/temporary unfit / unfit, in all groups, following guidelines will be adopted for issuance fitness certificate.

Abnormality	Fitness	Remarks
Color Vision Deficiency	Fit	Not to be placed where colour differentiation is required.
Audiometry	Fit	Not to be placed in high noise area
Vision (More than -4 D)	Fit	He/She may be considered fit fulfilling following conditions: 1) He/She is advised to undergo LASIK eye procedure. 2) Post LASIK power of vision should be less than -4.0D. 3) Post LASIK retinoscopy report should be normal.
Severe Obesity (BMI > 35.0)	Temp. Unfit	Due to severe obesity he is temporary unfit.
Diabetes (uncontrolled)	Temp. Unfit	Unfit until diabetes comes under control
Hypertension (Uncontrolled)	Temp. Unfit	Unfit until blood pressure comes under control
Pregnancy	Temp. Unfit	Unfit till the confinement

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CONTROL MEASURES FOR ENVIRONMENTAL ASPECT

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SR NO	ACTIVITIES	ASPECTS	IMPACTS ON ENVIRONMENT	CONTROL MEASURES
1	GENERAL ENV. REQUIREMENTS	Falling due to spreaded material / spool pieces	Land Nuisance /pollution	Housekeeping / Segregation of waste / Disposal at authorized sites
		Pollution due to waste material i.e. Damaged cables, welding rods, Gas cutting set hoses.		
		Noise due to pneumatic hammer/other equipment	Air pollution	Periodic maintenance
2	MATERIAL HANDLING	Possibility of failure during handling of equipment/s	ILand Nuisance /pollution/Loss of resources	Check capacity , route & verify test certificate/s
3	TRANSPORTATION	Vehicle Maintenance	Smoke / pollution	PUC / Fitness Certificates / Regular Maintenance.
			Noise Pollution	Other Special requirements based on the Material / Equipment being transported.
			Lube Oil Spillage.	
		Excessive loading and spillage	Air /Land Pollution	Avoid excessive loading

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SR NO	ACTIVITIES	ASPECTS	IMPACTS ON ENVIRONMENT	CONTROL MEASURES
4	CONSTRUCTION UTILITIES	Power	Air Pollution	Monitoring of exhausts
		Oil	Water & land pollution	Store at defined place and regular maintenance.
		Noise	Air Pollution	Ensure the noise levels as per regulation.
		Waste	Water & land pollution	Proper Segregation, Storage and Disposal
		Water	Air, Water & Land Pollution	Store at defined place and regular maintenance. Proper disposal
5	EXCAVATION	Excavated earth / material	Land Pollution	Disposal at authorized location
6	PILING	Piling equipment	Noise pollution	Ensure the noise levels as per regulation.
			Water & Land Pollution	Proper Segregation, Storage and Disposal at approved location Periodic maintenance, proper operation of equipment
7	PNEUMATIC DRILLING	Pneumatic Equipment	Noise pollution	Ensure the noise levels as per regulation.
			Resource Loss	Periodic maintenance and Proper Operation of Equipment

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SR NO	ACTIVITIES	ASPECTS	IMPACTS ON ENVIRONMENT	CONTROL MEASURES
8	REFRACTORY / INSULATION WORKS	Castables / Ceramic / Mineral / Glass wool material / etc.	Land Pollution	Disposal at authorized location
		Scrap / Waste Material		
9	PAINTING	Leakage / Splash during handling	Land pollution/Air pollution	Proper Operation of Equipment
		Empty paint & thinner Drums, Used brushes, paint soaked dhotis	Water Pollution	Disposal at authorized location
			Land Pollution	
10	GRINDING	Scrap and waste materials, Spillage of coolant	Water pollution and Land pollution	Disposal at Authorized location.
				Secondary Containment.
		Noise	Air Pollution	Ensure the noise levels as per regulation.
11	WELDING	Scrap and waste materials	Land Nuisance / Pollution	Disposal at Authorized location.
				Secondary obtainment.
12	GAS	Scrap and waste materials	Land Nuisance / Pollution	Disposal at Authorized location.
		Storage of Cylinders	Air Pollution	
13	DRILLING	Nosie	Air Pollution	Provide Ear Plugs
				Noise Monitoring
14	NDT	Storage & Use of Radiographic substance	Air Pollution, Water Pollution and Land Pollution	Ensure the storage & use as per regulation.

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15	BLASTING	Dust	Air Pollution	Use of appropriate hood/ sand blaster hood Apron by operators
		High noise	Air pollution	Controlled exposure
16	FLUSHING	Splashing of fluids	Land Pollution	Drained to OWS & then to ETP
	&	Drainage of Fluid used for testing	Water Pollution/Land pollution	Drained to OWS & then to ETP
	TESTING	Disposal of Waste Material, Empty Containers	Water Pollution	Disposed to authorized location.
17	SITE CLEARANCE	Disposal of Hazardous Waste	Water Pollution	Disposed to authorized location.
	HANDING OVER	Disposal of Non-Hazardous Waste	Water Pollution	Disposed to authorized location.

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Appendix : 18

SITE PERMIT TO WORK

		SITE PERMIT TO WORK		N
1. WORK PERMIT IDENTIFICATION AND DESCRIPTION - by Permit Requester				
☐ Cold	☐ Electrical Hazard	☐ Excavation	☐ Manbasket	☐ Crane Lift
☐ Hot	☐ Work at Height	☐ Radiography	☐ Hazardous Material	☐ Lock out / Tag out
☐ Confined Space	☐ Road Interruption	☐ Night Work	☐ Pressure Test	☐ Pre-Commissioning
☐ Grating Removal				
☐ Scaffold				
☐ Other				
Associated Documents - by Permit Requester				
☐ Method Statement	☐ JHA	☐ Competent pers.	☐ MSDS	☐ P&ID
☐ Lifting Plan	☐ Undergr Map/Draw	☐ Scaffold Study	☐ Hazardous Material	☐ Plot Plan
☐ Grating Removal				
☐ Other				
Performer:		Receiver:		Select Area on the Map
Description of the work:		Area/Location		
JOB / MEANS - by Permit Requester				
☐ Crane	☐ Motor Generator	☐ Drilling Machine	☐ Forklift	☐ Gas Cylinder
☐ Excavator	☐ Elevating Platform	☐ Welding Machine	☐ Hand Tools	☐ Torch/Free flames
☐ Pneumatic Tools	☐ Ladder	☐ Slings/Chain	☐ Compressor	☐ Thermal treatment
☐ Vessel/Sewer	☐ Chain Block/Tir fort	☐ Scaffolding	☐ Man Basket	☐ Concrete pump
☐ NDT Source	☐ Other:			
☐ Truck/Vehicle-mixer vacuum				
☐ Electrical hand tools				
☐ Chemicals				
☐ Bridge Crane				
POTENTIAL HAZARD IDENTIFICATION - by Permit Requester				
☐ Collapse	☐ Falling Object	☐ High Noise	☐ Hit by Moving Object	☐ Crash Moving Object
☐ Fall from Height	☐ Suspended Load	☐ High Tension Contact	☐ Sharp Contact	☐ Hydrocarbons
☐ Cables/Housekeeping	☐ Drown	☐ Asphyxia	☐ Radiation	☐ Burn
☐ Fire/Explosion	☐ Pressure/Vacuum	☐ Temperature	☐ Chemicals	☐ Previous Danger Subst.
☐ Harmful Contact				
☐ Breathing Danger				
☐ Dust				
☐ Other:				
GENERAL PRECAUTIONS - by Permit Requester				
☐ Mandatory PPE	☐ Special Overall C, T	☐ Rubber Gloves/Boot	☐ Iso. Electrical gloves	☐ Face Shield / Hook
☐ Goggles	☐ Dust Mask FP	☐ Filter Mask	☐ Ear Muffs	☐ Harnesses (2 ropes)
☐ Man Watching	☐ Ventilation/Aspiration	☐ Air Supplier/Respirator	☐ Ear plugs	☐ Lifejacket
☐ Entry Log	☐ Rescue Plan	☐ No Work top/down	☐ Additional lighting	☐ Alternative route
☐ Safety rope	☐ Radio/Air Horn	☐ Life Rope	☐ Winch / tripod	☐ Maintain Wet
☐ Soil Class/Sloping	☐ Shoring/Reinforce	☐ Isolate the Area	☐ Hand Excavation	☐ Shields
☐ Signs (warning)	☐ Night Warning	☐ Water ready	☐ Sewer/drain isolated	☐ Grounding equipment
☐ Fire Watching	☐ Extinguisher Ready	☐ Antistatic/spark	☐ Scaffolding	☐ Process (P, T) Safe
☐ GAS TEST	☐ AIR TEST	☐ Electric. safe	☐ No Work above/below	☐ Road interruption
☐ Other:				
☐ Restrict Access/Barricade				
☐ Guarded insulated tool				
☐ Depressurized/Drained				
☐ LOTO - Blind				
☐ Low Voltage 24 V				
☐ Steamed/water/inert flush				
☐ Gas Detector				
☐ Spark Containment (100%				
☐ SCUBA apparatus				

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COMPLEMENTARY FORMS TO BE FILLED BEFORE TO ISSUE WORK PERMIT (NEXT PAGE)							
☐ Lock out / Tag out		☐ Gas / Air Test		☐ Road Closure		☐ Other	
☐ Other							
Validity Request	From	Date :	Time :	Until	Time :		
Requester (Name & Surname)			Signature			Date	
2. WORK PERMIT REVIEW - by Permit Reviewer							
Validity Given	From	Date :	Time :	Until	Time :		
Other Cooperation needed :		☐ No	☐ Yes				
TECHNICAL REVIEWER (Name & Surname)			Signature			Date	
HSE REVIEWER (Name & Surname)			Signature			Date	
3. WORK PERMIT APPROVAL - by Permit Issuer							
Concur that the requirement to proceed cover the job, I certify that I'm aware of the work as defined is to be carried out as per Paragraph 1 and 2, as stated after Reviewer signs (if foreseen). I issue the work permit after complementary measures requested are taken and all the measures related to the work to be done are in place.							
ISSUER (Name & Surname)			Signature			Date	
4. WORK PERMIT EXECUTION - by Permit Receiver							
I accept the job site supervision as per paragraph 1,2,3 and any Complementary Permit and Complying with requirement & precaution needed for safe work.							
RECEIVER (Name & Surname)			Signature			Date	
5. REVALIDATION							
I confirm that the conditions of the permit have not changed since initiation. Work may continue over the next period							
Revalidation N.	Date	Start Time/End Time	Receiver Name	Signature	Issuer Name	Signature	Technical Reviewer Initial
1							
2							
6. WORK CLOSURE							
If/We have inspected the work and accept that the work has been completed in accordance with the work scope and this permit's requirements - The site has been left in housekeeping and safe conditions related to the work done - All inhibited system for this PTW can be reverted to normal after this section (see next page)							
Receiver			Issuer		Date :	Time :	
Permit closed out on			Reviewer		Date :		

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Appendix : 19

ROUTINE ENVIRONMENTAL INSPECTION

ROUTINE ENVIRONMENTAL INSPECTION

Inspector : _____ Date _____ Time: _____

Area inspected: _____ Subcontractor name: _____

General Site Observations	Compliance		Remarks with Responsible Party
	Acceptable	Action Req.	
Ensure waste is segregated and placed in appropriate containers			
Ensure waste containers are secured and properly covered			
Ensure that no waste is accumulated by site boundaries			
Ensure that all hazardous materials are labelled, stored and handled according to health and safety regulations			
Ensure washout from concrete trucks is contained in defined location			
Ensure oil and hazardous materials are stored away from drains or watercourses			
Ensure oil and chemicals are not left on site unattended			
Ensure that leaking containers are removed from site and disposed of correctly			
Ensure that drip trays are placed under static plant			
Ensure that spill kits are available			
Ensure that secondary containment (e.g. bunds) is provided for storage of hazardous materials			
Ensure diesel tanks are positioned on an impervious surface and within a bunded area			
Ensure diesel tank hoses are kept within the bunded area			
Ensure that fuelling is carried out only by authorised personnel			
Ensure measures are implemented to avoid mud entering drains (e.g. sandbags)			
Ensure no concrete enters drains			
Ensure that pumping is carried out through filters when required			
Visually check water quality from pumping			
Ensure that run-off water cannot directly enter watercourses			
Ensure that temporary or completed earthworks are sealed			
Check cleanness of channels adjacent to Site			
Check cleanness of channels adjacent to Mobil cleanness			
Ensure entrance and site roads are clean and free of mud			
Ensure that stockpiles are located out of the wind to minimise the potential of dust generation			
Ensure plants and vehicles are switched off when not in use			
Ensure that all vehicles on site do not generate smoke			
Ensure noisy plant and machinery is located away from sensitive areas			
Ensure equipment is well maintained			
Ensure appropriate signs are in place where required			
Ensure general housekeeping of the site is acceptable			
Ensure that measures are in place to protect stored materials from vandals			
Other:			
Additional Comments:			

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Appendix : 20

CAMP HYGIENE INSPECTION

CAMP HYGIENE REPORT

1. KITCHEN

- a. Are staffs wearing the correct clothing & shoes? Are haircut and nails being properly maintained? Is personal hygiene well maintained? _____
- b. Are all utensils cleaned and properly maintained? _____
- c. Is the refrigerator clean & operating at correct temperature) _____
- d. Are temperature charts maintained? _____
- e. Are all washing up areas in good order? _____
- f. Are floors, wall, ceiling & cabinets clean? _____
- g. Are the correct cleaning materials used for each job and are they used correctly? _____
- h. Are cleaning materials stored separately from Foodstuff? _____
- i. Are cutlery and crockery & cutting boards in good order? _____
- j. Is the oven & other equipment clean? _____
- k. Is the electric bug killer functional? _____
- l. Is ventilation adequate? _____
- m. Has staff received training in Hygiene? _____
- n. Are staff medical checkups are being done on regular basis? _____
- o. Are Fire extinguishers & fire blanket placed and maintained? _____
- p. Is trash bin covered at all times? _____
- q. Are sanitary fittings functional and working? _____
- r. Is Charcoal filter clean? _____
- s. Are food handlers using separate Toilets / washrooms? _____

2. FOOD STORAGE

- a. Are correct storage methods being used? _____
- b. Is the quality of food products satisfactory? _____
- c. Are shelves and pallets clean? _____
- d. Are cleaning materials stored separately? _____
- e. Is the electric bug killer functional? _____
- f. Is ventilation adequate? _____
- g. Is lighting adequate? _____

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- h. Are fire precautions / prevention satisfactory? _____
- j. Does staff understand the requirement for separate storage areas for different foods? _____
- k. Are freezers / refrigeration / chillers operating at the correct temperature? _____
- l. Are temperature charts maintained regularly? _____
- m. Is cold storage space adequate? _____
- n. Are expiry dates correct and mentioned? _____

3. MESS

- a. Are staffs wearing the correct clothing & shoes? Are haircut and nails being properly maintained? Is personal hygiene well maintained? _____
- b. Are floors, wells & ceiling clean? _____
- c. Is the refrigerator clean & operating at correct temperature? _____
- d. Are temperature charts maintained? _____
- e. Is the electric bug killer functional? _____
- f. Is ventilation adequate? _____
- g. Is lighting adequate? _____
- h. Are tables & chairs clean? _____
- i. Do all items comply with expiry dates? _____
- j. Are ORDS / salt tablets available? _____
- k. Are Food handlers clean and tidy? _____

4. ACCOMMODATIONS

- a. Are rooms correctly ventilated / air-conditioned? _____
- b. Is lighting adequate? _____
- c. Is ventilation adequate? _____
- d. Are rooms clean? _____
- e. Is bed linen clean? _____
- f. Is there evidence of food consumption in room? _____
- g. Are ashtrays provided for smokers at designated locations? _____
- h. Are rest areas adequate? _____

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5. TOILETS AND WASHROOMS

- a. Are toilets in clean condition and unclogged?
- b. Are floors, walls and ceiling clean?
- c. Is ventilation adequate?
- d. Is lighting adequate?
- e. Is hot and cold-water supply adequate?
- f. Are sanitary fittings functional and working?

6. DRINKING WATER SUPPLY

- a. How is Drinking water supplied?
- b. Are water filters/UV fitted and maintained correctly?
- c. Is quality of drinking water being tested on regular basis?

7. LAUNDRY (TWICE IN A WEEK)

- a. Are the laundry and the machines clean?
- b. Are washers and dryers working?
- c. Is ventilation adequate?
- d. Is lighting adequate?
- e. Is the laundry neat & tidy?
- f. Are washers and dryers adequate in quantity?
- g. Are supplies & quality of cleaning materials adequate?
- h. Is laundryman clean and tidy?
- i. Does laundryman carry out of his work satisfactorily?

8. WASTE DISPOSAL

- a. Are bins provided in kitchen, mess, food stores, laundry & rooms?
- b. Are these bins washed regularly & emptied everyday?
- c. Is proper waste segregation & disposal system in place?
- d. Is soak / burn pit not overflowing?

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Appendix : 21

DAILY SAFETY CHECKLIST

DAILY SAFETY CHECKLIST (To make use of before start of day's work)

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

Description of Job decided to perform :-

Use of PPE / Safety Gadgets

SL No	PPEs	Compliance (Yes / No)	SL No	PPEs	Compliance (Yes / No)
1	Safety Helmets		6	Face Shield	
2	Safety Shoes		7	Full body harness	
3	Hand Gloves		8	Fall Arrest System	
4	Dust Mask		9	Safety net	
5	Safety Goggles		10	Horizontal life-line made of steel wire, (dia not less than 8.0 mm.)	

(Serial No. 1 & 2 are compulsory for everyone. Specify & ensure use of other safety gadgets as required for the job)

Identify following important unsafe conditions: -

SL No	Conditions	Yes / No
1	Access to work site / emergency escape clear	
2	Soil / Loose earth kept away from excavated pit / slope / ladder provided	
3	Electrical wire / welding lead lying entangled on ground / welding m/c. booth accessible	
4	Elevated work platform / open ends are protected	
5	Ground area cordoned off before lifting works or erection at height / ground area checked & cordoned-off before start of height works	
6	Structural members / erected pipes / wooden boards/pieces etc. are safely anchored at heights and are not likely to fall down on people when working beneath	
7	Rope ladders tied-up on tall steel structures, long before are removed to get rid of their use	
8	Any Other	

Indicate actions taken, if status of any of the above items is found "No"

Specific Safety guidelines / precautions, if any (communicated thro' TBT)

Above conditions and PPE compliances are checked by undersigned and correct status are indicated after verification

Inspected by
Contractor Engineer

Verification By
Contractor Safety Officer

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Appendix : 22

HOUSEKEEPING ASSESSMENT & COMPLIANCE

(Sheet 1 of 2)

HOUSEKEEPING ASSESSMENT & COMPLIANCE

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

Sl No.	Subjects of Review	Satisfactory/ Yes	Non satisfactory/No	Remarks	Action
1.	Cleanliness at the Main entry / access of site				
2.	Ground condition / floor areas free from water-logging / oil spillage				
3.	Ground & elevated floors free from rubbish / wastes / accumulated debris / scraps.				
4.	Manholes / openings are covered / fenced				
5.	Trenches are barricaded / walkways are in place				
6.	Drains are cleaned / not choked / not occupied by dumped materials				
7.	Sufficient CAUTION boards / instructions displayed				
8.	Construction machinery are maintained & parked in orderly manner.				
9.	Movement of site people are not obstructed because of dumping / storing of construction materials				
10.	Access / egress to Electrical Distribution Boards / Panels clear from wires / cables / earth-strips etc.				
11.	Electrical panel rooms / sheds / MCC / Control rooms / Substations etc. are clean & tidy and not used for storing dress / clothes, tiffin-box or bicycles.				
12.	Passage behind Elec. panels are free for access				
13.	Fire extinguishers / fire-buckets are accessible without any difficulty.				
14.	Stair-steps, platforms & landings are clear & tidy				
15.	Sheds / rooms & work areas have got sufficient illumination as well as ventilation				
16.	Cables / Wires / welding leads are routed / hanged appropriately & are not creating unsafe condition.				
17.	Stacking / storing of insulation materials or their packing.				
18.	Removal or cleanliness of left-over sand, concrete, brick-bats, insulation-materials, excess earth, wastes etc.				
19.	Storing / stacking of sand, metal chips, re-bars, steel pipes, valves, fittings etc.				
20.	One escape route at ground & minimum two escape routes at elevation available,				

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Sl No.	Subjects of Review	Satisfactory/ Yes	Non satisfactory/No	Remarks	Action
21.	Captions / Posters / Slogans on various safety instructions are displayed legibly in local language				
22.	Cable trenches are water-free or regular arrangement for taking out accumulated water exists.				
23.	Windows of rooms / offices are regularly cleaned				
24.	Facilities for cycle sheds, drinking water, washing, rest-rooms etc. are maintained in tidy manner.				
25.	Toilet, Urinals, Canteen / kitchen / pantry etc. are maintained & free from obnoxious smell.				
26.	Construction tools / tackles are stored systematically - the items are tagged / tested / certified by competent third party.				
27.	Sufficient numbers of Dust-bins / Waste-bins found at site and are regularly emptied.				

Additional remarks, if any -

.....
.....
.....

Inspected by
Contractor Engineer

Verification By
Contractor Safety Officer

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Appendix : 23

INSPECTION FOR SCAFFOLDING

INSPECTION FOR SCAFFOLDING

(Sheet 1 of 2)

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

Sl. No	Description	Yes	No	N.A	Actions taken
1	Whether work permit is obtained to take up work at height above 1.5 Mts?				
2	Whether atmospheric condition is "stormy" or "raining" and works at heights have been permitted?				
3	Whether steel pipes scaffoldings are used for units /off-site areas?				
4	Whether scaffolding has been erected on rigid/firm/leveled surfaces / ground? Whether "foot-seals" or "base-plates" are used beneath the up-rights (vertical steel pipes)				
5	Whether scaffold construction is as per IS specification with toe-board and hand-rails (top-rail as well as mid-rail)?				
6	Whether distance between two successive up-rights are less than 2.5 Mts (height of scaffold & load carrying capacity governs the distance between two uprights)				
7	Whether all uprights are extended at least 900 mm above the top most working platform (to enable fitting of handrails)?				
8	Whether vertical distance of two successive ledgers is satisfactory? (varying between 1.3 Mts. To 2.1 Mts)				
9	Whether the peripheral areas of working at height are cordoned-off? (for avoiding accident to people arising out of dropped / deflected materials)				
10	Whether platform is provided? Is it safely approachable?				
11	Whether end of scaffold platform / board are extended beyond transoms? (125mm to 150 mm)				
12	Whether CE / IS approved quality and worthy conditioned full-body safety harness (with double lanyard & karabiners) are used while working at heights?				
13	Whether life-line of safety harness is anchored to an independent secured support capable of withstanding load of a falling person?				
14	Whether the area around the scaffold is cordoned off to prohibit the entry of unauthorized person / vehicle?				
15	Whether clamps used are of good condition, of adequate strength and free from defects?				
16	Whether ladder is placed at secured and leveled surface?				
17	Whether water-pass and oil-spills are avoided around the scaffold structure?				
18	Whether ladder is extended 1.5mts. above the landing point at height?				
19	Whether more than one access/egress provided to the scaffold?				
20	Whether ladder used are of adequate length and overlapping of short ladders avoided?				
21	Whether metallic ladders are placed much away from near-by electrical transmission line?				
22	Whether rungs of ladder are inspected and found in good order?				
23	Whether fall-arresters provided on both the access/egress routes?				
24	Whether diagonal (cross) bracings are provided at regular interval on the scaffold?				
25	Whether working platform on the scaffold has been made free from "jolt" or "gap"?				
26	Whether tools or materials are removed after completion of the day's job at heights?				
27	Whether a valid Permit for Work (PFW) is obtained before taking up work over asbestos or fragile roof?				
28	Whether sufficient precaution is taken while working on fragile roof?				

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ANNEXURE

“GUIDELINES ON PERSONAL PROTECTIVE EQUIPMENT” - (PPE)

Guidelines on Personal Protective Equipment (PPE)

<u>INDEX</u>			
SN	DESCRIPTION	PPE TO BE USED	Page No
1	Work at Height (height > 2 M)	• Safety Shoe (A) • Full Body Safety Harness With shock absorbers (Two alternatives), • Shock absorbing lanyard double 'Y' type • Restrain Lanyard, • Rope Grab (In case of vertical life line being used) • Helmet (A)	4-11
2	a) Excavation. b) Fire pump Operation. c) Testing of Pressure Gauge	• Helmet (B) • Safety Shoe (A)	12-13
3	Excavation involving dewatering works	• Helmet (B) • Gumboot • Gloves (Two alternatives) • Goggles	14-18
4	Blast Cleaning	• Helmet (B) • Safety Shoe(A) • Goggles • Ear Muff • Gloves (Two Alternatives) • Apron (Three Alternatives) • Half face mask	19-26
5	Painting (Confined space / external)	• Helmet (A) • Safety Shoe • Gloves (Two alternative) • Half face mask • Apron (Two Alternatives)	27-30

Guidelines on Personal Protective Equipment (PPE)

<u>INDEX</u>			
SN	DESCRIPTION	PPE TO BE USED	Page No
6	a) Working in Confined space b) Testing of Gas sensor c) Tank Gauging d) De Gassing of LPG Cylinder e) Shuttering works f) Brick masonry g) Handling of Battery	• Helmet (B) • Safety Shoe (A) • Gloves (Two Alternatives)	31-32
7	a) Road work. b) Reinforcement c) Concreting	• Helmet (B) • Gum Boot • Goggles • Gloves (Two Alternatives)	33-34
8	a) Grass Cutting b) Blinding & de-blinding work	• Helmet (B) • Gum Boot	35
9	Electrical Work	• Safety Shoe (B) • Helmet (B) • Gloves (Electrical)	36-38
10	Working with possibility of	• Helmet (B) • Safety Shoe (A) • Goggles • Apron (Two Alternatives)	39-41

Guidelines on Personal Protective Equipment (PPE)

<u>INDEX</u>			
SN	DESCRIPTION	PPE TO BE USED	Page No
11	Welding and Cutting works	• Welding shield • Safety Shoe (A) • Apron Welding • Gloves (Welding) • Helmet (B)	42-44
12	Tank Cleaning	• Helmet (B) • Gum Boot • Apron (Two Alternatives) • Gloves (Two Alternatives)	45-47
13	Product pump house operation	• Helmet (B) • Safety Shoe (A) • Goggles • Gloves (Two Alternatives)	48-19
14	DG Operation	• Helmet (B) • Safety shoe (B) • Ear muff • Electrical glove	50

- 1) **Additional PPE to be provided for various activities as per requirement of Job Safety Analysis (JSA), OISD and Statutory stipulations.**
- 2) Training inputs as required to be given for proper usage, maintenance of PPE.
- 3) Various EN Standards / BIS codes mentioned are available on line on IOCL CO, HSE website.

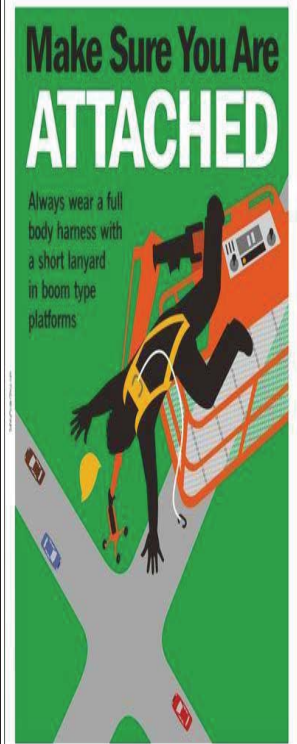
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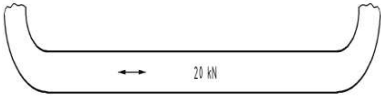
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
1	Work at Height (height > 2 M) Contd... 	I) Safety Shoe (A)  	The safety shoe shall have following marking as per IS 15298 (part -2) : - size; - manufacturer's identification mark; - Year of manufacture and at least quarter; - License No (CM/ L) - IS Mark Category of Safety Shoe Category of Safety shoe (S1, S2, S3 etc) as required as per Table 16 of IS 15298 (part 2) : 2011 S1 : Closed seat region, Antistatic properties , Energy absorption of seat region S2 : S1 plus Water penetration and water absorption. S3 : S2 plus Penetration resistance (S3) Cleated outsole	- Striking against stationary object. - Striking by moving object - Stepping on hot object - Stepping on sharp object - Penetration (S3 category) - Water penetration and absorption. (S2 & S3 category)	- Not suitable for hazards like Chemical burns , electrical flash, welding spark and heat radiation - Not suitable if it is necessary to minimise electrostatic charges in the shortest possible time . - Not suitable for work in explosive work area.		- Exceeding one year from the date of first use of the shoe . - sign of crack / damage . - Excessive wear - As per Manufactures recommendations.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) Contd... 	II) Full body Safety Harness with energy absorber : (Alternative -I) Lanyard along with 5 Point (1 Dorsal + 2 Textile loops+ 2 sternal D ring) harness to be used for rescue or tower climbing The ABC's of Fall Protection 	1. The full body harness shall conform to EN 361 Marking on the full body harness shall conform to 2.2 of EN 365:1992 and any text shall be in English. In addition to conforming to 2.2 of EN 365:1992 the marking shall include the following. - On the full body harness, a pictogram to indicate that users shall read the information supplied by the manufacturer.  - A capital letter "A" at each fall arrest attachment element; - The model/ type identification mark of the full body harness; - The number of this European Standard, i.e. EN 361. 2. Connector shall conform to EN 362 and Marking on the connector shall conform to EN 365. The marking shall include: - The model/ type identification mark of the connector. - EN number & the letter of the class e.g. EN 362:2004/A	Accidental fall - Direct the loads to legs. - Keeping body upright. - Prevent the neck damage - slightly opens the breathing way. - Prevents from colliding with the ground or structure in case of a fall. - Antistatic characteristics	- Shall be of no use if anchor point / life line / lanyard is not properly designed. - There should be proper arrangement for rescue - After accidental fall & before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out) SAFETY BELT NOT TO BE USED		- Sign of crack / damage/ stitching giving way - Webbing and rope for cuts, tears, excessive wear and damages - If in doubt "Throw it Out" - As per Manufact ures recomme ndations

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) Contd...	A Typical specimen of marking. 	- Marking of major axis strength with gate closed & locked.   Please see required PPE of "Energy absorbing lanyard " for attaching to safety Harness. Energy absorbing lanyard double 'Y' Type To be attached to full body harness at one end and life line at other end - Must if full body harness being used for protection against fall. - The total length of a lanyard connected to an energy absorber (including terminations and connectors) shall not exceed 2 m.				

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) - Contd... 	III) Full body Safety Harness with energy absorber (Alternative -II) 	Full body harness conforming to IS 3521 may be allowed in "Green field project" where antistatic safety harness are not required. Following marking to be ensured in case of IS marked full body Harness. - The name, trade-mark or other means of identification of the manufacturer or the supplier who is responsible for acting on behalf of the manufacturer for claiming compliance with this standard; - Manufacturer's product identification information that shall include the manufacturer's batch or serial number that enables the origin of the item to be traced; - The year of manufacture; The identity of the fibre used as the material of construction; - Information that states by appropriate means the intended purpose of each attachment element and to identify specifically those attachment elements that are designed to be used as part of a complete fall arrest system; and - Warning for not to deviate from the manufacturer's instructions.	Accidental fall - Direct the loads to legs. - Keeping body upright. - Prevent the neck damage - slightly opens the breathing way. - Prevents from colliding with the ground or structure in case of a fall.	- Shall of no use if anchor point / life line / lanyard is not properly designed. - There should be proper arrangement for rescue - After accidental fall & before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out) SAFETY BELT NOT TO BE USED ISI marked full body harness are not antistatic hence not recommended in running plants.		- Sign of crack / damage/ stitching giving way - Webbing and rope for cuts, tears, excessive wear and damages - If in doubt "Throw it Out" - As per Manufactures recommendations

Name of
Manufacture
and other details

ISI Mark and number

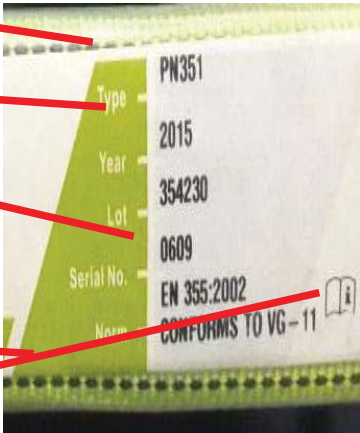
A Typical specimen of marking



Other details such
year of
manufactures ,
batch number etc

Material used

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) - Contd...  Model / Type and identification mark Year of manufacturing EN number Maximum length Pictogram	Energy absorbing lanyard double 'Y' Type To be attached to full body harness at one end and life line at other end Must if full body harness being used for protection against fall. - The total length of a lanyard connected to an energy absorber (including terminations and connectors) shall not exceed 2 m. A Typical specimen of marking 	Energy absorbing lanyard shall conform to EN 355 and shall have the following marking : a) On the energy absorber, a pictogram to indicate that users shall read the information supplied by the manufacturer (see figure);  b) the maximum length allowed of the energy absorber including lanyard; c) the model/ type identification mark of the energy absorber; d) the number of this European Standard, i.e. EN 355. The marking shall conform to EN 365 and additionally shall include the following : a. Means of identification, e.g. manufacturer's name, supplier's name, or trademark; b. Manufacturer's production batch or serial number or other means of traceability; c. Model and type/ identification; d. Number and year of the document to which the equipment conforms; e. Pictogram or other method to indicate the necessity for users to read the instructions for use.	Accidental Fall	- Shall of no use if anchor point / life line is not properly designed. - There should be proper arrangement for rescue - After accidental fall & before safety harness becoming effective, the person should not strike ground / object. (Prevent risk of bottoming out)		- Sign of cut / damage - After every fall. - As per manufacturer's recommendation.

Guidelines on Personal Protective Equipment (PPE)

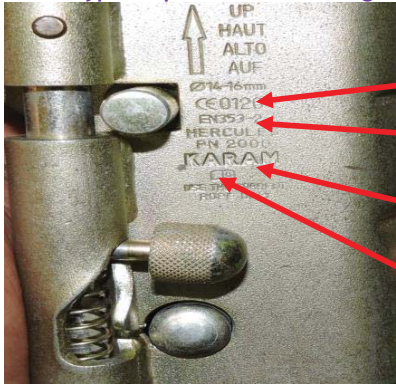
SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) - Contd... 	IV) Restraint lanyard - To be secured to properly designed anchorage - The restraint lanyards need not have shock absorption element incorporated in them	Lanyard shall conform to EN 354 (latest edition). Connector incorporated in lanyard shall conform to EN 362. Marking on the lanyard shall conform to EN 365 and, in addition, shall include at least the following: a) the maximum lanyard length, in accordance with 4.1.6; b) the month and year of manufacture. As per EN 365 marking shall include : - Means of identification, e.g. manufacturer's name, supplier's name, or trademark; - Manufacturer's production batch or serial number or other means of traceability; - Model and type/ identification; - Number and year of the document to which the equipment conforms; - Pictogram or other method to indicate the necessity for users to read the instructions for use. A Typical specimen of marking 	Accidental fall - Lets a worker travel just far enough to reach the edge but not far enough to fall over	- Shall be of no use if life line & anchor points are not properly designed. - To ensure that fall restraint lanyards are never used for the purpose of fall arrest		Check metal fittings for sharp edges, excessive wear, correct operation and distortion. - If in doubt "Throw it Out"  - As per Manufactures recommendations

Name of manufacture

Batch Number, serial Number, Material, Static strength, Pictogram

Pictogram

Guidelines on Personal Protective Equipment (PPE)

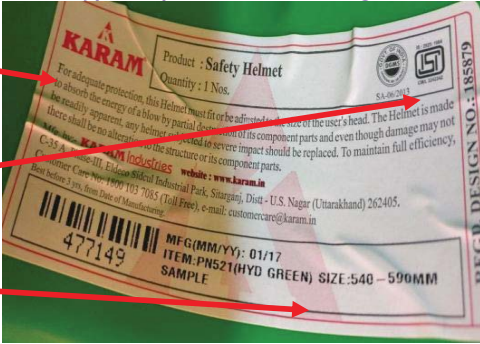
SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Work at Height (height > 2 M) - Contd... 	V) Rope Grab (in case of vertical lifeline being used) The rope grab immediately grabs on the line in the event of a fall, thereby arresting the fall   Pictogram	Rope grab shall conform to EN 353-2 : 2002 & Marking on the guided type fall arrester and the flexible anchor line shall conform to EN 365 . In addition shall include the following: - Means of identification, e.g. manufacturer's name, supplier's name, or trademark; - Manufacturer's production batch or serial number or other means of traceability; - Model and type/ identification; - Number and year of the document to which the equipment conforms; - Pictogram or other method to indicate the necessity for users to read the instructions for use. A Typical specimen of marking 	- Accidental fall - The anchorage line in connection with the given rope grab provides necessary shock absorption.	Shall be of no use if life line & anchor points are not properly designed.		- Check metal fittings for sharp edges, excessive wear, correct operation and distortion. - If in doubt "Throw it Out" - Coloured tracer strand which loses its colour in due course of time to show that the rope is now is unfit for future use - As per Manufactures recommendations

Note : PPE mentioned at III, IV & V above may not be required simultaneously while working at height. These use shall depend upon type of activity

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
1	Work at Height (height > 2 M) 	VI) Helmet (A) 	The helmet shall conform to EN 12492 and shall have following markings : a) the number of this European Standard; b) the name or trademark of the manufacturer and/ or his authorized representative; c) the designation of the model; d) the year and quarter of manufacture; e) the size or size range (in cm).	- Shock absorption - Penetration - Impact Within limits stipulated in EN 12492	- The protection given by a helmet depends on the circumstances of the accident and wearing a helmet cannot always prevent death or long term disability. - There may be a foreseeable risk that helmets could become trapped and thereby cause a risk of strangulation. - Cannot provide protection against hazard like splash of hot liquid, work in hot area, cryogenic or corrosive liquid , flying hot particles like chipping, welding, direct fire hazard, contact with bare live electrical conductor .	 	- Sign of crack / damage . - De-colouration - failing in lab test to be done every 1-2 years depending on condition - cradle to be changed after every one year - On sustaining a severe blow even if damage is not apparent - As per Manufactures recommendations. For cleaning, maintenance or disinfection, use only substances (No Solvent) that have no adverse effect on the helmet and are not known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer's instructions and information).

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
2	a) Excavation. b) Fire pump Operation. c) Testing of Pressure Gauge	1) Helmet (B) 	The helmet shall conform to either IS 2925 or EN 397 a) The helmet conforming to IS 2925 shall have following marking - Manufacturer's name or trade-mark, - Size of helmet. - The helmets may also be marked with the ISI Certification - Mark. A Typical specimen of marking 	- Shock Absorption Resistance - Penetration Resistance - Impact Protection as per EN 397 - Shock absorption - Penetration resistance - Impact The above protection shall be within the limitations of various test as stipulated in IS 2925 / EN-397. Marking for Optional test as per EN 397 as per clause no 7.2.2. Each helmet shall carry moulded or impressed marking or shall carry a durable self-adhesive label stating the optional requirements complied with, as follows: Optional requirement Marking/ Label - Very low temperature –20 °C or –30 °C as appropriate - Very high temperature + 150 °C - Electrical insulation 440 V a.c. - Lateral deformation LD - Molten metal splash MM	Not suitable for hazards like splash of hot liquid, work in hot area, cryogenic or corrosive liquid, flying hot particles like chipping, welding, direct fire hazard, contact with bare live electrical conductor		- Sign of crack / damage . - De-colouration - cradle to be changed after every one year - On sustaining a severe blow even if damage is not apparent - As per Manufactures recommendations <i>For cleaning, maintenance or disinfection, use only substances (No Solvent) that have no adverse effect on the helmet and are not known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer's instructions and information).</i>

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
2	Contd a) Excavation. b) Fire pump Operation. c) Testing of Pressure Gauge		b) In case helmet conforming to EN 397 to be used to facilitate various attachment for providing protection against hazards like splash of hot liquid, flying hot particles like chipping, welding, direct fire hazard the following moulded or impressed marking to be ensured. a) number of this European Standard ie 397 b) name or identification mark of the manufacturer; c) year and quarter of manufacture; d) type of helmet (manufacturer's designation). This shall be marked on both the shell and the harness; e) size or size range (in centimetres). This shall be marked on both the shell and the harness. f) abbreviation for the material of the shell shall be in accordance with EN ISO 472. (For example, ABS, PC, HDPE, etc.) A Typical specimen of marking 	Type of Helmet Year of Manufacture Size			
		II) Safety shoe- (A) 	• Please refer (I) on page 4				Please refer (I) on page 4

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : Contd.. 	I) Helmet as per IS and EN (B) 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13.

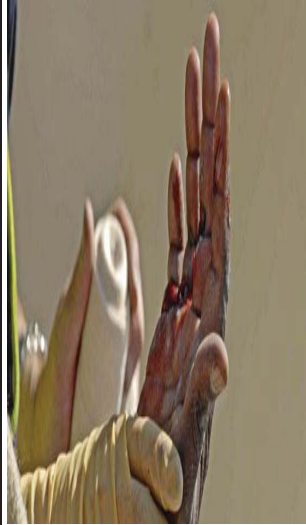
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : Contd  Month and year of manufacture ISI Mark	II) Gum Boot -Safety  A Typical specimen of marking  	The gum shall conform to IS 12254 and have following marking : - Name of the manufacturer or its recognised trade-mark, if any; - Size No.; - Batch No., and - Month and year of manufacture.	- Striking against stationary object. - Striking by moving object - Stepping on sharp object - Water, alcohols, acids and alkalis	- Not suitable for hazards like Chemical burns, electrical flash, welding spark and heat radiation - Not suitable if it is necessary to minimise electrostatic charges in the shortest possible time. - Not suitable for work in explosive work area.		- exceeding one year from the date of first use of the shoe. - sign of crack / damage / cut - Excessive wear As per Manufactures recommendations

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Typical Industrial Operation	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Excavation work Involving dewatering works : Contd.. 	III) Goggle :  A Typical specimen of marking  Scratch Resistance Manufacture Name	The goggles shall conform to EN 166 and EN 170 & shall have following markings : - Marking on the lens as Impact resistance (B) Optical Class (1) , anti fogging (N), Anti Scratch resistance (K), no 2-1.2 marked 2C - shade as per EN 170, Manufacture's Name CE and any other point as per discretion of IOCL in line with EN 166 and 170	surround the eye area, give more protection in situations where one encounters splashing liquids, fumes, vapors, powders, dusts, and mists	Limitation : Uncomfortable to wear with other head gear like helmet, ear muffs or respirator		- exceeding one year from the date of first use of the goggles . - sign of crack / damage . - Excessive wear As per Manufactures recommendations

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : Contd..  Name of Manufacture → CE Marking → Size → EN Number and pictograms → EN Pictogram → 	IV) Gloves Alternative - I : Gloves as per EN stand 374 and 388.  A Typical specimen of marking	Gloves shall conform to EN 374 and 388 & gloves shall have the following markings as per as per EN 420 a) Name, trade mark or other means of identification of manufacturer or his authorized representative; b) Glove designation (commercial name or code allowing the user to identify clearly the product within the manufacturer's/ authorized representative's range); c) Size designation; d) Date of obsolescence a if applicable per clause 7.2.3 e) Pictogram (s) appropriate to the standards accompanied by the reference of the applicable standards and performance levels which shall always be in the same fixed sequence as defined in the corresponding standard Cat -III Certificate to be ensured.	• Tear • cut • Abrasion • Puncture	Not suitable for hazards like electrical flash, welding spark and heat radiation		• sign of crack / damage / cut • Excessive wear • IMPORTANT All gloves must be thrown away (in the hazardous waste bin if required) no more than 8 hours after initial contact with the chemical. • Achieving date of obsolescence • As per Manufactures recommendations WARNING If you work with moving machine parts, choosing a glove that is the right size and made from a less durable material is vital, since the glove easily tears apart if you get caught in the machinery.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
3	Excavation work Involving dewatering works : Contd.. 	Alternative - II Gloves as per IS 6994. 	Alternative -II Alternatively Gloves shall conform to IS : 6994 (Part I) - 1973 & shall have the following marking . a) The manufacturer's name or recognized trade-mark; b) The type and nominal size of the gloves; c) Year of manufacture; and d) Where applicable, the words 'light mass', 'medium mass', or 'heavy mass ' The gloves may also be marked with the Standard Mark. Light Abrasion ix of table 2 Recommended type of Gloves. is 1, 2, 8, 14. 15. 16	• Light handling operation • Tear • Puncture • Cut	Not suitable for hazards like electrical flash, welding spark and heat radiation		• sign of crack / damage / cut • Excessive wear • As per Manufactures recommendations IMPORTANT All gloves must be thrown away (in the hazardous waste bin if required) no more than 8 hours after initial contact with the chemical. WARNING If you work with moving machine parts, choosing a glove that is the right size and made from a less durable material is vital, since the glove easily tears apart if you get caught in the machinery.

As of May 2017 there is no party having BIS license. Use of this product is permitted assuming that in future some party may get BIS license.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Typical Industrial Operation	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	Blast cleaning - (confined space / external) 	I) Helmet (A) 			Please refer (VI) on page 11			Please refer (VI) on page 11
		II) Safety Shoe 			Please refer (I) on page 4			Please refer (I) on page 4
		III) Goggle 			Please refer (III) on page 16			Please refer (III) on page 16

Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard																						
4	Blast cleaning - (confined space / external) - Contd <table><thead><tr><th colspan="2">Permissible Noise exposure as per OSHA 29 CFR 1910.95</th></tr><tr><th>DB</th><th>Hours</th></tr></thead><tbody><tr><td>90</td><td>8</td></tr><tr><td>92</td><td>6</td></tr><tr><td>95</td><td>4</td></tr><tr><td>97</td><td>3</td></tr><tr><td>100</td><td>2</td></tr><tr><td>102</td><td>1.5</td></tr><tr><td>105</td><td>1</td></tr><tr><td>110</td><td>0.30</td></tr><tr><td>115</td><td>0.15 or less</td></tr></tbody></table> Name of manufacture CE Marking EN Number	Permissible Noise exposure as per OSHA 29 CFR 1910.95		DB	Hours	90	8	92	6	95	4	97	3	100	2	102	1.5	105	1	110	0.30	115	0.15 or less	IV) Ear Muff of suitable size "Medium size range "fit satisfactorily in majority of Industrial Application  A Typical specimen of marking 	Ear muff shall conform to EN 352 shall have following marking : a) the name, trade mark or other identification of the manufacturer or his authorised representative; b) the model designation; c) the number of this EN Standard, i.e "EN 352" d) in the case of ear-muffs intended by the manufacturer to be worn in a particular orientation, an indication of the FRONT and/ or TOP of the cups, and/ or an indication of LEFT and RIGHT cup. Check the NRR (Noise Reduction Rating,) to ensure noise exposure within permissible limits	Extreme noise Noise induced hearing losses Note : In addition to hearing loss, excessive noise exposure may contribute to mental and physical stress, certain illnesses, and accidents	Over 8 hours may be uncomfortable in hot environments . Eyeglass wearers may not get a good seal Resonate (vibrate) at lower sound frequencies		Ear muff with cracked, cut, or missing gaskets Excessive wear & tear Damage if any. As per Manufactures recommendations
Permissible Noise exposure as per OSHA 29 CFR 1910.95																													
DB	Hours																												
90	8																												
92	6																												
95	4																												
97	3																												
100	2																												
102	1.5																												
105	1																												
110	0.30																												
115	0.15 or less																												

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	Blast cleaning - (confined space / external) Contd 	V) Gloves Alternative -I Hand gloves - involving high pressure as per EN 388 and 374. 		Please refer (IV) on page 17			Please refer (IV) on page 17.
	Blast cleaning - (confined space / external) Contd 	Alternative -II - Gloves as per IS 6994 		Please refer (IV) on page 18 Gross Abrasion sr no. VIII of table 2 Recommended type of Gloves. is 2,8			Please refer (IV) on page 18.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
4	Blast cleaning - (confined space / external) - Contd 	VI) Apron Alternative -I : Apron as per EN 13982 -1 	The apron shall conform to EN 13892-1 and shall have following markings : 1. The marking shall be clearly visible and as durable as adequate for the life of the clothing. a) name, trademark or other means of identification of the manufacturer; b) manufacturer's type number, identification number or model number; c) type of this chemical protective clothing, i.e. type 5; d) reference number and date of publication of this part of ISO 13982 (i.e. ISO 13982-1:2004); e) year of manufacture and, if appropriate, the expected shelf-life of the clothing (this information may be marked on every commercial packaging unit instead of being marked on every item of clothing); f) size designation as defined in EN 340:2003, Clause 6; g) pictogram showing that the suit is for protection against chemicals [ISO 7000-2414; see Figure 1 a)] and pictogram to show that the manufacturer's instructions should be read [ISO 7000-1641; see Figure 1 b)];  a)  b)	Protection to the full body against airborne solid particulates.	Not suitable for flame and Hot material	Damage / infection to skin etc 	- exceeding six month from the date of first use of the apron . - sign of crack / damage . - Excessive wear As per Manufactureres recommendations - Do not use compressed air to clean as this will create dust in the air. - Clean and decontaminate tarps and other equipment on the worksite.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitati on of PPE	Hazard of Not wearing of PPE	When to be discard
4	Blast cleaning - (confined space / external) : Contd Name of Manufacture Size CE marking Other information Pictograms as per EN	A Typical specimen of marking  Year of manufactures	2.  Type 5 – Protection against airborne solid particulate chemicals (Norm: EN ISO 13982-1) 3. Apron / instructions shall have following pictogram indicating the intended purpose . (Table E-2 of EN 340)  Protective clothing (equipment for abrasive blasting operation) ISO 7000-2482				

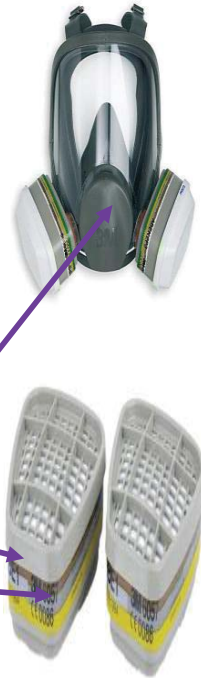
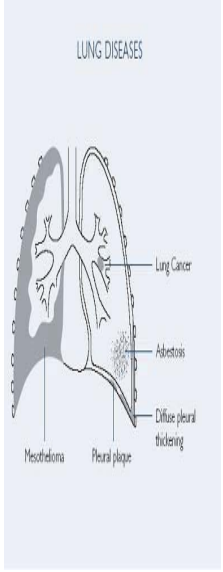
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Blast cleaning - (confined space / external) Contd 	Alternative -II : Apron as per IS 4501 	Alternative -II : Alternatively suit shall conform to IS : 4501 : 1981 shall have the following marking . The marking shall be clearly visible and as durable as adequate for the life of the clothing. - marked inside with manufacturer's name or recognized trade mark, if any. The ink shall be non-irritating to skin and shall not impair the quality of aprons. - The aprons may also be marked with the ISI Certification Mark. - The finished material shall be white or of a suitable colour on two sides as agreed to between the purchaser and the supplier. As of May 2017 there is no party having BIS license. Use of this product is permitted assuming that in future some party may get BIS license.	Protection to the full body against airborne solid particulates.	Not suitable for flame and Hot material	Damage / infection to skin etc 	- exceeding six month from the date of first use of the apron . - sign of crack / damage . - Excessive wear As per Manufactureres recommendations - Do not use compressed air to clean as this will create dust in the air. - Clean and decontaminate tarps and other equipment on the worksite.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Blast cleaning - (confined space / external) Contd	Alternative -III : Boiler suit / coverall 	Alternative -III : Cloth and stitching should be of good quality on visual inspection	Protection to the full body against airborne solid particulates.	Not suitable for flame and Hot material	Damage / infection to skin etc 	- exceeding six month from the date of first use of the apron . - sign of crack / damage . - Excessive wear As per Manufactures recommendations - Do not use compressed air to clean as this will create dust in the air. - Avoid blasting in windy conditions to prevent the spread of any hazardous materials.

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Blast cleaning - confined space - Contd  Name of Manufactures EN Number CE Marking	VII) Half face mask A Typical specimen of marking 	1. The half air mask shall conform to EN 140 and shall have following : - The manufacturer shall be identified by name, trade mark or other means of identification. - All units of the same model shall be provided with a type-identifying marking. - Size (if more than one size is available). - The number and the year of this European Standard. ie EN 140 - Where the reliable performance of components may be affected by ageing, means of identifying the date (at least the year) of manufacture shall be given Parts which are designed to be replaced by the authorized user and sub-assemblies with considerable bearing on safety shall be readily identifiable. For parts which cannot reasonably be marked e.g. straps of head harness, the relevant information shall be included in the information supplied by the manufacturer. The end of shelf life may be indicated on packing eg e.g. by the following pictogram.  Code for dates xx/xx Month Year	Respiratory protection. Protection against inhaling dust, etc.	Not suitable for heavy gas concentration	Silicosis Occupational lung diseases. Deposition of particulate matter in Lung. 	- Sign of crack / damage - Excessive wear - Damage of strap - After end of shelf life - Change of filter / cartridges at least every six month - Performance of the components may be affected by aging As per Manufactures recommendations Cleaning Always clean the half-mask after use. First remove the filter and remove dust with compressed air. Use a cloth to remove any stubborn deposits. If necessary, dismantle the parts and rinse in warm water with a small quantity of mild detergent. Never use solvents. The inhale and exhale valves should be removed and cleaned thoroughly .

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
5	Painting - confined space / external 	I) Helmet (A) 	Please refer (VI) on page 11				Please refer (VI) on page 11
		II) Safety Shoe 	Please refer (I) on page 4				Please refer (I) on page 4
		III) Goggles 	Please refer (III) on page 16				Please refer (III) on page 16

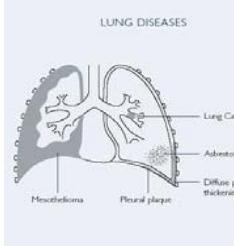
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
5	Painting -(confined space / external) : Contd 	VI) Gloves Alternative -I Hand gloves - involving high pressure as per EN 388 and 374 					Please refer (IV) on page 17
		Alternative -II - Gloves as per IS 6994 		• Please refer (IV) on page 18 Spraying paints or cellulose lacquers sr no. XIV of table 2 : Recommended type of Gloves. is 1,8			Please refer (IV) on page 18

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Painting -(confined space / external) : Contd	V) Apron :Alternative -I Apron as per EN 13982 					Please refer (VI) on page 22 and 23
		Alternative -II Apron as per IS 4501 					Please refer (VI) on page 24

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Painting -(confined space / external 	VI) Half face mask 		Please refer (VII) on page 26			Please refer (VII) on page 26

Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
6	a) Working in Confined space b) Testing of Gas sensor c) Tank Gauging d) De Gassing of LPG Cylinder e) Shuttering works	I) Safety Helmet (B) 	• Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
	f) Brick masonry g) Handling of Battery	II) Safety Shoe (A) 	• Please refer (I) on page 4				Please refer (I) on page 4

Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
6	Contd.. a) Working in Confined space b) Testing of Gas sensor c) Tank Gauging d) De Gassing of LPG Cylinder e) Shuttering works f) Brick masonry g) Handling of Battery	III) Gloves Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374 	Please refer (IV) on page 17				Please refer (IV) on page 17
		Alternative -II Gloves as per IS 6994 	Please refer (IV) on page 18 Light Abrasion ix of table 2 Recommended type of Gloves. is 1, 2, 8, 14. 15. 16				Please refer (IV) on page 18

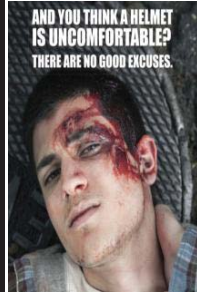
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
7	a) Road work b) Reinforcement c) Concreting	I) Helmet (B) 	• Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) Gum Boot 	• Please refer (II) on page 15				Please refer (II) on page 15
		III) Goggles 	• Please refer (III) on page 16				Please refer (III) on page 16

Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
7	Contd.. a) Road work b) Reinforcement c) Concreting	VI) Gloves Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374 	Please refer (IV) on page 17				
		Alternative II as per IS 6994 	Please refer (IV) on page 18 Light Abrasion ix of table 2 Recommended type of Gloves. is 1, 2, 8, 14. 15. 16				

Guidelines on Personal Protective Equipment (PPE)

N	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
8	a) Grass Cutting b) Blinding and de-blinding flange work	I) Gum Boot 	Please refer (II) on page 15				Please refer (II) on page 15
		II) Helment (B) 					Please refer (I) on page 12 & 13

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	Electrical works Electrical sub-station current carrying equipment 	II) Safety Shoe (B)  A Typical specimen of marking 	The safety shoe shall have following marking as per IS 15298 (part -2) : - size; - manufacturer's identification mark; - Year of manufacture and at least quarter; - License No (CM L) - IS Mark Category of Safety shoe (,S3 etc) as required as per Table 16 of IS 15298 (part 2) : 2011 <i>The sole shall be regulated to high voltage test upto 15 KV voltage applied across the sole for 1 min. Necessary test certificate for this test from FDI/NABL accredited party to be furnished .</i>	- Striking against stationary object . - Striking by moving object - Electrical resistance	- Not suitable for work in explosive work area. - Or - Work activities requiring antistatic work		- Exceeding one year from the date of first use of the shoe . - Sign of crack / damage - Excessive wear - As per Manufactureres recommendations

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	Electrical works : Electrical sub-station current carrying equipment Contd 	II) Electrical Hand gloves Insulating Rubber Electrical Gloves  Manufacture Name Test Potential Maximum working potential	The gloves shall be marked indelibly at the back with the following information as per IS4770 - Size and type of glove; - Maximum working potential in Volts; - followed by the word 'working' in brackets; - Identification of the source of manufacture; and - Month and year of manufacture moisture absorption certificate to be checked. A Typical specimen of marking  Type -1 Gloves not to used	Type 2—For use at voltage not exceeding 1 100 ac rms Type 3—For use at voltage not exceeding 7 500 ac rms Type 4—For use at voltage not exceeding 17 000 ac rms.	1) Type of the PPE restricts the maximum voltage at which it can be used 2) Other precautions to be taken while working on electrical installation		- Frequently used Gloves to be re-tested at intervals of not more than 6 months. - Gloves issued for occasional use shall be re-tested after use or in any case at intervals of not more than 12 months. - Gloves Showing any defects - As per Manufactures recommendati ons

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
9	Electrical works : Electrical sub- station current carrying equipment Contd 	Helmet as per EN 397 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 and 13

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
10	Working with possibility of splashes of hot, cryogenic or corrosive liquids 	I) Helmet (B) as per EN 397 	Please refer (I) on page 12 and 13				Please refer (I) on page 12 and 13
		II) Safety Shoe 	Please refer (I) on page 4				Please refer (I) on page 4
		III) Goggles 	Please refer (III) on page 16				Please refer (III) on page 16

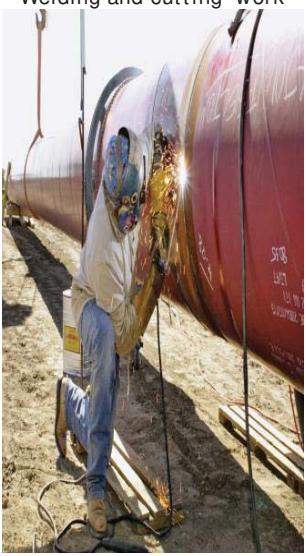
Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
10	Working with possibility of splashes of hot, cryogenic or corrosive liquids. Contd 	IV) Gloves Alternative - I : Hand gloves - involving high pressure as per EN 388 and 374 	• Please refer (IV) on page 17				Please refer (IV) on page 17
		Alternative - II Gloves as per IS 6994. 					

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
	Working with possibility of splashes of hot, cryogenic or corrosive liquids Contd	V) Apron Alternative -I Apron as per EN 13982 	Please refer (VI) on page 22 &23				Please refer (VI) on page 22 &23
		Alternative -II Apron as per IS 4501 	Please refer (VI) on page 24				Please refer (VI) on page 24

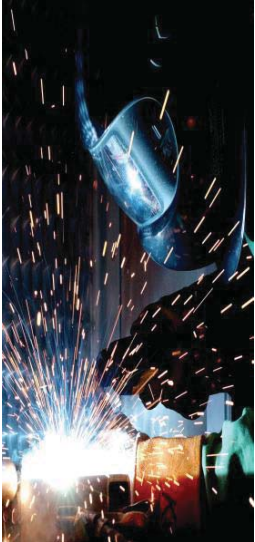
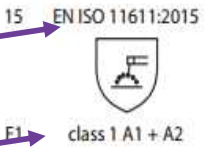
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	Welding and cutting work 	I) Helmet attachable welding shield (A)  II) Welding Helmet with welding Shield (B)  Name of Manufacture → CE Mark and EN Mark → Name of Manufacture EN166 FT 	a) Helmet mountable welding shield. - Conforms to EN 175 - Protective lens made of clear high impact resistant. polycarbonate conforming to EN 166 and ANSI Z 87.1 - polypropylene Impact Resistance Shell conform to EN 175 F - The welding shield shall be CE marked - Marking on protective shall be fully visible - Ocular marking shall be as per clause 9.2 of EN 166 b) Welding Helmet with welding Shield - Protective lens made of clear high impact resistant. polycarbonate conforming to EN 166 and ANSI Z 87.1 - polypropylene Impact Resistance Shell conform to EN 175 F - Marking on protective shall be fully visible - Ocular marking shall be as per clause 9.2 of EN 166	Protection during welding. Liftable welding lens allows clear view while restricting harmful dust particles.	To be used only in conjunction with safety helmet & should not be used independently. However welding helmets can be used independently.		- Exceeding one year from the date of first use of the goggles. - sign of crack / damage on lenses - Excessive wear As per Manufact ures recomme ndations

Guidelines on Personal Protective Equipment (PPE)

	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	Welding and cutting work : Contd 	II) Safety Shoe 		Please refer (I) on page 4			Please refer (I) on page 4
		Helmet as per EN 397 (in case Helmet attachable welding shield being used) 		• Please refer (I) on page 12 & 13			Please refer (I) on page 12 and 13

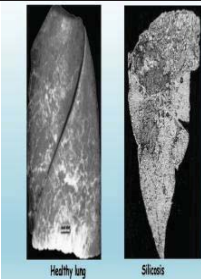
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
11	Welding and cutting work Contd. 	III) Apron  A Typical specimen of marking 	- Apron shall conform to EN ISO 11611 & shall have the following markings : - classification: : - Class 1: the number and year of this International Standard (ISO 11611) followed by the graphical symbol shown in below and the indication "Class 1" and the indication "A1" or "A1 + A2" as appropriate for Limited Flame Spread; - Class 2: the number and year of this International Standard (ISO 11611) followed by the graphical symbol shown in Figure 1 and the indication "Class 2" and the indication "A1" or "A1 + A2" as appropriate; garments conforming to Class 2 shall meet Class 2 for all performance requirements; - instructions for cleaning shall be marked (e.g. on a label). 	- minimize skin burns - caused by sparks, spatter, or radiation	- Additional electrical insulation layers will be required where there is an increased risk of electric shock; garments meeting the requirements of clause of en ISO 11611 (6.10) are designed to provide protection against short term, accidental contact with live electric conductors at voltages up to approximately 100 V d.c. - any identified hazards against which the clothing is intended to protect (e.g. flames, molten metal spatter, radiant heat, and short term accidental electrical contact); for protective clothing, a warning that additional partial body protection may be required, e.g. for welding overhead;		- On contaminated with flammable material. - Manufacturers shall include the information that welder's protective clothing be cleaned regularly in accordance with the manufacturer's recommendations. After cleaning, the clothing shall be visually inspected for any sign of damage. - Similarly, users should be advised that if they experience sunburn-like symptoms, UVB is penetrating. - In either case, the garment should be repaired (if practicable) or replaced and consideration given to the use of additional, more resistant, protective layers in future. - As per Manufactures recommendations

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	Tank cleaning 	I) Helmet (B) 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) Gum Boot 	Please refer (II) on page 15				Please refer (II) on page 15

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	Tank cleaning Contd. 	III) Apron Alternative -I Apron as per EN 13982  Alternative -II Apron as per IS 4501 		Please refer (VI) on page 22-23 & 24			Please refer (VI) on page 22-23 & 24

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
12	Tank cleaning : Contd 	IV) Gloves Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374 	Please refer (IV) on page 17				Please refer (IV) on page 17
		Alternative - II Gloves as per IS 6994. 					Please refer (IV) on page 18

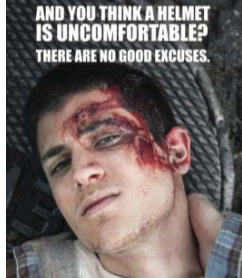
Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
13	Product pump house operation 	I) Helmet (B) 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) Safety Shoe 	Please refer (I) on page 4				Please refer (I) on page 4
		III) Goggles 	Please refer (III) on page 16				Please refer (III) on page 16

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
13	Product pump house operation Contd 	IV) Gloves :Alternative -I : Hand gloves - involving high pressure as per EN 388 and 374 	• Please refer (IV) on page 17				Please refer (IV) on page 17 & 18
		Alternative - II Gloves as per IS 6994. 	• Please refer (IV) on page 18 Light Abrasion ix of table 2 Recommended type of Gloves. is 1, 2, 8, 14. 15. 16				

Guidelines on Personal Protective Equipment (PPE)

SN	Activity (Pictorial Display)	Required PPEs	Quality assurance	Protection Against hazard	Limitation of PPE	Hazard of Not wearing of PPE	When to be discard
14	DG Operation : 	I) Helmet (B) 	Please refer (I) on page 12 & 13				Please refer (I) on page 12 & 13
		II) Safety Shoe (B) 					Please refer (II) on page 36
		III) Ear Muff 					Please refer (IV) on page 20
		IV) Electrical Gloves 					Please refer (IV) on page 37

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Annexure-II

JOB SPECIFICATION FOR RIGGING, HAULAGE & HEAVY LIFT

0	21.11.2019	ISSUED FOR IMPLEMENTATION	TB	PKP / LA	LA	JMC
REV.	DATE	STATUS	WRITTEN BY	CHECKED BY	APPROVED BY	AUTHOR. BY
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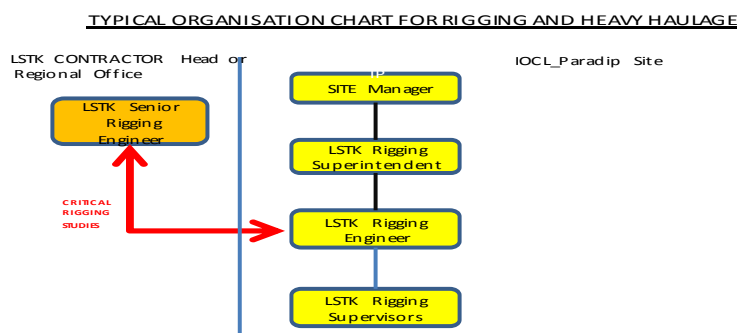
1 PURPOSE

The purpose of this procedure is to define key elements of a viable crane, rigging and haulage safety management system to be adopted on IOCL-Paradip

2 SCOPE

The scope of this procedure is intended to include all LSTK personnel and subcontractors engaged in lifting and heavy haul work activities. Subcontractors may elect to use alternative forms of documentation but they shall adhere to the fundamental elements of this procedure.

3 ROLES AND RESPONSIBILITIES



3.1 SITE MANAGER AND CONSTRUCTION MANAGER

The Site and Construction Manager has the ultimate responsibility to ensure that this procedure is followed for all rigging and heavy haul activities.

3.2 RIGGING SUPERINTENDENT /SUPERVISOR

The Rigging Superintendent/Supervisor shall have the necessary experience and knowledge in their designated field of work.

The Rigging Superintendent/Supervisor is responsible for;

- All the project lifting and heavy haul activities.
- Ensuring all crane operators and riggers are certified.
- Preparing Medium Lift Plans with the Site Rigging Engineer.
- Co-ordinating crane schedules and resources.
- Co-ordinating any specialist subcontracted heavy haul company.
- Conducting Pre-Lift and Pre-Haul Safety Talks

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- Ensuring rigging and heavy haul plans are carried out as per approved procedures and standards.
- Maintaining the site rigging equipment inventory.
- Ensuring Tool Box Talks are conducted on a regular basis and before each lift.

3.3 SITE RIGGING ENGINEER

The Site Rigging Engineer shall have the necessary experience in the preparation and compiling of rigging & haulage plans and is required to have a technical and in depth knowledge in their designated field of work.

The Site Rigging Engineer is responsible for;

- Overseeing all rigging and heavy haul activities.
- Co-ordinating with the Senior Rigging Engineer during the preparation of critical lift and critical haulage plans.
- Preparation of Medium Lift Plans with the Rigging Superintendent/Rigging Supervisor.
- Preparation of Medium & Critical Haulage Plans with the specialist subcontracted heavy haul company.
- Ensuring construction hold points are identified for lifting and heavy haul activities.
- Ensuring necessary ground improvement conditions are identified.
- Ensuring all lifts and heavy haul activities are categorised correctly.
- Identifying any additional assistance required during project execution or planning e.g. geo-technical, engineering resources.
- Providing technical rigging support to site personnel.
- Co-ordinating with Procurements to review transportation drawings and site delivery of equipment from Vendors.

3.4 SENIOR RIGGING ENGINEER

The Senior Rigging Engineer is usually located in the Head or Regional home office and has an in-depth knowledge and expertise in the field of rigging and heavy haulage.

The Senior Rigging Engineer is responsible for;

- Providing support as and when necessary to the Site Rigging Engineer, Rigging Superintendent /Supervisor and Sub-Contractors.
- Preparation of critical lift and critical haul plans with the Site Rigging Engineer.
- Review and approval of all critical lift and critical haul plans.
- Review and approval of medium lift and medium haulage plans if not reviewed and approved by the Site Rigging Engineer.

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3.5 CRANE OPERATOR

All Crane Operators shall be certified in accordance with the 'Certification System for Crane Operators' or a comparable national or international certification system. The Crane Operator shall be a competent person, trained, certified, carry the appropriate license to operate a specific model and crane capacity and shall have the necessary documented training available for review.

The crane operator shall be responsible for;

- Selecting the appropriate boom, jib and crane configuration to meet lift requirements and to determine the net capacity of this configuration.
- Completing the Daily Crane Operation Log (Attachment A1) with the Rigger for all light lifts.
- Operate the crane in a safe, controlled and smooth manner.
- Inspect the crane on a daily basis and fill in the Crane Daily Checklist and report any faults to the Rigging Superintendent / Supervisor.
- Inform the Rigging Superintendent/Supervisor of any potentially dangerous conditions before or during the lifting operations.
- Identification of all potential hazards.
- Correct utilization and understanding of the cranes load chart.
- Having a thorough knowledge of the cranes operating manual and to fully understand the cranes limitations.
- Knowing the load and rigging weight at all times.
- Assessment of weather conditions before and during the lift.
- Checking the site is adequately prepared for the crane location.
- Never leaving the crane controls while a load is suspended.
- Ensuring the crane is set up, assembled and rigged as per manufacturer's specifications.
- Attending Pre-Lift Safety and Toolbox talks.

3.6 RIGGER

All Riggers shall be certified in accordance with the 'Certification System for Riggers' or a comparable national or international certification system. The rigger certification levels are Rigger 1(Advanced level), Rigger 2 (Intermediate level) and Rigger 3 (Basic Level). Depending on the riggers certification level they shall only be allowed to carry out specific roles and responsibilities which are detailed in the table below;

Rigger 1 Advanced Level	Rigger 2 Intermediate Level	Rigger 3 Basic Level
Can perform and manage all types of rigging activities.	Can perform and manage all lifts classified as 'light lifts'.	Carries out site preparation (barricading, sign posting and colour coding) Can assist in handling taglines but not permitted to do any lift alone and must always work under the supervision of a Level 1 or Level 2 Rigger.

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The Rigger shall be responsible for;

- Attaching the rigging equipment to the load correctly (Rigger 1 medium/critical lifts & Rigger 2 light lifts) and ensuring the rigging is in accordance with the approved lift plan. (Rigger 1)
- Ensuring all rigging equipment that is used is inspected and holds current certification. (All rigger levels)
- Ensuring that all JSA's and Pre-lift Checklists (Medium and Critical Lifts) are completed prior to the lift. (Rigger 1)
- Selecting the correct rigging equipment when carrying out light lifts. (Rigger 2)
- Reviewing any approved Medium and Critical lift plans prior to the lift. (Rigger 1)
- Completing the Daily Crane Operation Log (Attachment A1) with the Crane Operator for all light lifts. (Rigger 2)
- Attending Pre-Lift, Pre-Haul and Toolbox talks when required. (All rigger levels)
- Ensuring any additional PMC/ OWNER requirements are followed and approved rigging practices are carried out at all times. (All rigger levels)
- Giving the correct and approved hand signals to the crane operator. Rigger 1 Medium and Critical lifts, Rigger 2 'light lifts'.
- Knowing the load and rigging weight at all times. (All rigger levels)
- Assessment of weather conditions before and during the lift. (Level 1& Level 2 Riggers)

3.7 SUB-CONTRACTORS

Any Sub-Contractors engaged in any project execution, planning, review and approval of any lifting or heavy haul activities shall follow the core requirements of this procedure. This includes addressing identification of any required ground improvements or other site conditions e.g. foundations that could affect the installation or transportation of equipment.

3.8 LOGISTICS DEPARTMENT

The Logistics Department shall co-ordinate through the relevant contractor to ensure that any haulage of any major pieces of equipment (Medium or Critical classification) outside of the site facilities has been planned well in advance, ensure the route has been surveyed and there are no impediments on route that would adversely affect the safe and timely delivery of the equipment to site.

The Logistics Department shall also advise site in a timely manner of any equipment being delivered to site that requires a Lift Plan so that the Rigging Department has sufficient time for preparation and the required signatory approvals.

3.9 LIFTING EYE AND OR TRUNNIONS

The design for the safe transportation and lifting of equipment shall be the responsibility of the LSTK Contractor. LSTK Contractor shall ensure that the design of adequate lifting eyes and/or trunnions and transport support points.

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3.10 ENGINEERING

When an additional level of expertise is required during the planning of heavy lift and haul activities engineering support shall be sought either within the company or through additional third parties.

Engineering support can include but is not limited to the following;

- Verification of loads imposed on permanent structures during any construction activities such as jacking and skidding operations, strand jack lifts and installation of tower cranes.
- Verification of designed and proposed lifting points.
- Verification and assistance in the design of special lifting attachments, lifting and spreader beams etc.
- Design and verification of any requirement for additional structural strengthening such as bracings.
- Verification of loads imposed on large structures during lifting or haulage e.g. modules.

4 DEFINITIONS

4.1 PAYLOAD

Payload is the weight of the item you are intending to lift. The payload is to include additional attachments such as transportation saddles, temporary supports, stiffeners and insulation etc. The rigging weight which is associated with the payload is not to be included.

4.2 COMPETENT PERSON

A competent person is a person who has extensive knowledge and experience and can successfully demonstrate their competency in their designated field of work.

4.3 CRANE

A crane is a device used for raising, shifting or lowering a load. It shall refer to any device that is stationary or mobile including but not limited to Crawler Cranes, Telescopic Cranes, Strand Jack Systems, Gantry Cranes and Hydraulic Jacking Systems.

4.4 RIGGING EQUIPMENT

Rigging equipment are items that are used to attach to a payload to lift, secure and/or support. Examples include but are not limited to the following; slings, shackles, spreader beams, lifting beams etc.

4.5 SAFE WORKING LOAD

Safe Working Load (SWL) is the maximum load which can be lifted, suspended or lowered by a device such as a crane, hoist or lifting equipment. The components with the lowest safe working load limits the total capacity.

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4.6 TRANSPORTATION EQUIPMENT

Transportation equipment is any piece of equipment used to transport a load. Examples include but are not limited to the following self propelled trailers, trailers hauled by a truck and barges.

4.7 METRIC SYSTEM

For this procedure, the metric system will be used for weights and measures. For the weight metrification system “tonne” refers to 1000 kgs and is sometimes abbreviated as “t”.

4.8 RIGGING ACTIVITIES

Rigging activities is any lifting of a payload that falls under this Rigging and Heavy Haulage procedure.

4.9 HEAVY HAUL ACTIVITIES

Heavy haul activities are the movement of any materials or equipment from one defined point to another that falls under this Rigging and Heavy Haulage procedure.

4.10 RIGGING & HAULAGE PLANS

These are a group of approved documents that illustrates the efficient and safe manner as to how the lift and/or transportation shall be carried out.

4.11 SAFE LIMIT OF APPROACH

Safe Limit of Approach is the closest distance to an energized power line a piece of equipment can operate e.g. crane or trailer. A spotter shall be deployed at all times when operating near energized power lines and personal protection barriers used.

Line Voltage Absolute Safe Limit of Approach for operational clearances are detailed in Table 1 and transit clearances are detailed in Table 2 ;

Table 1 – Operational Clearances

- Up to 50 KV – 3.05 meters (10ft)
- Over 50 KV to 200 KV - 4.6 meters (15ft)
- Over 200 KV to 350 KV - 6.1 meters (20ft)
- Over 350 kv to 500 KV – 7.62 meters (25ft)
- Over 500 KV to 750 KV – 10.67 meters (35ft)
- Over 750 KV to 1000 KV – 13.72 meters (45ft)

Table 2 – Transit Clearances

- Up to .75 KV – 1.22 meters (4ft)
- Over 0.75 KV to 50KV - 1.83 meters (6ft)
- Over 510KV to 345 KV - 3.05 meters (10ft)

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- Over 345 KV to 750 KV – 4.88 meters (16ft)
- Over 750 KV to 1000KV – 6.1 meters (20ft)

KV= Kilovolt (1000 volts), a unit of electrical potential difference.

Any country standards or client requirements found to be more stringent shall take precedence over the above criteria.

4.12 LIFT DATA SHEET

Lift Data Sheets contain groups of operational parameters which gives the required information for the lifting activity.e.g. crane type/configuration, rigging equipment and crane deductibles etc. Technip data sheets consist of a Single Lift Plan Data Sheet (refer to Attachment 5) and a Two Crane Tandem or Upending Lift Plan Data Sheet (refer to Attachment 6). It is recommended that all LSTK contractors use these data sheets or follow a similar format. These Lift Data Sheets are available in Excel format from the Technip or optionally they can be printed and the required information manually input.

5 REFERENCES

Reference Standards

- Code of Practice for Safe Use of Cranes
- GeneralBS 7121-1 : 2006
- Inspection, Testing and ExaminationBS 7121-2 : 2003
- Mobile Cranes.....BS 7121-3 : 2000
- Lorry Loaders.....BS 7121-4 : 1997
- Tower Cranes.....BS 7121-5 : 1997
- Offshore Crane.....BS 7121-11 : 1998
- Code of Practice for Safe Use of Cranes.....CP 3010 : 1972
- Cranes-Requirements for Health
and Safety –Limiting and Indicating Devices.....BS EN 12077-2 : 1999
- Cranes- Mobile Cranes.....BS EN 13000 : 2004
- Cranes-Safety-Hand Powered Lifting Equipment.....BS EN 13157 : 2004
- Cranes-Safety-Non Fixed Load Lifting Attachments.....BS EN 13155 : 2003
- Offshore Cranes-General Purpose Offshore Crane.....BS EN 13852-1 : 2004
- Cranes and Lifting Appliances- Selection of Wire Rope.....BS ISO 4308-1 : 2003
- Lifting Slings – Methods of Rating.....BS 6166-1 : 1986
- Lifting Slings- Specification for Marking.....BS 6166-2 : 1986
- Guide to the Selection and Safe Use of Lifting Slings for
Multiple Purposes.....BS 6166-3 : 1988
- Short Link Chain Slings for Lifting
Purposes- Safety Chain Slings GR 8.....BS EN 818-4 : 1997
- Flat Woven Webbing Slings.....BS EN 1492-1 : 2000
- Round Slings.....BS EN 1492-2 : 2000
- Steel Wire Rope Slings- Safety Slings for General Service.....BS EN 13414-1 :2003
- Grommets and Cable Laid Slings.....BS EN 13414-3 : 2003
- Steel Wire Ropes- General Requirements.....BS EN 12385-1 : 2002
- Steel Wire Ropes-Definitions.....BS EN 12385-2 : 2003
- Steel Wire Ropes-Information for Use and Maintenance.....BS EN 12385-3 : 2004

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- Stranded Ropes for General Lifting.....BS EN 12385-4 : 2002
- Lifting Appliances.....ISO 4301-1 : 1986
- Mobile Cranes.....ISO 4301-2 : 1985
- Tower Cranes.....ISO 4301-3 : 1993
- Jib Cranes.....ISO 4301-4 : 1989
- Overhead Travelling and Portal Bridge Cranes.....4301-5 : 1991
- Stability of Cranes.....ISO 4304 : 1987
- Lifting Operations and Lifting Equipment Regulations.....LOLER – UK : 1998
- Provision and Use of Work Equipment Regulations.....PUWER 1998

6 CLASSIFICATION OF LIFT PLANS

The competent person planning the lift shall refer to the lift classifications in the following table to determine the classification of the lift and to determine the amount of planning and documentation required.

6.1 LIFT PLAN CLASSIFICATION TABLE

Light Lift	• Payload 0 tonne to less than 20 tonne
Medium Lift	• Payload 20 tonne to less than 50 tonne • Greater than 75% but less than 90% of a cranes chart capacity • Any two crane lift below 75% of a cranes chart capacity • 75% or less than 90% of a cranes hoist line pull capacity
Critical Lift	• Payload 50 tonne or greater • 90% or greater of a cranes chart capacity • Any two crane lift where either crane is 75% or greater of a cranes chart capacity • Any lift using more than two cranes • Lifting over or within 10 meters of existing facilities e.g. piperacks, electrical switch rooms • Any part of a crane and/or load when working within 10 meters of any populated traffic area. • 90% or greater of a cranes hoist line pull capacity • Any crane lift within 1 meter of a crane safe limit of approach of power lines • Hydraulic Gantry Lifts • Strand Jack Lifts • Skidding or jacking operations
Notes	Any lift that involves high cost or long lead items may be reclassified to a higher lift classification if management deem it necessary.

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6.2 SIGNATORY APPROVAL & DOCUMENTATION REQUIREMENTS FOR LIFT PLANS

Light Lifts

No lift data sheet or rigging plan is required for lifts classified as 'light' but the Daily Crane Operation Log (Attachment A1) and Rigging/Heavy Haul Job Safety Analysis (Attachment A2) must be completed. In addition, a Level 2 (Intermediate) Rigger and Crane Operator shall carry out all light lifts and approved safe rigging practices shall be used at all times.

Medium Lifts

The rigging plan shall be prepared and completed by the Site Rigging Superintendent/ Supervisor and/or Site Rigging Engineer Medium Lift Plans shall be reviewed and approved by the LSTK Site Rigging Superintendent/Supervisor and Site Rigging Engineer. In addition, LSTK contractor generated Medium Lift Plans need to be reviewed and approved by the PMC /OWNER

Critical Lifts

The rigging plan shall be prepared and completed by the Site Rigging Engineer and/or Senior Rigging Engineer. All Critical Lift Plans shall be reviewed and approved by the LSTK Site Rigging Superintendent, Site Rigging Engineer, Site or Construction Manager. In addition, LSTK contractor generated Critical Lift Plans need to be reviewed and approved by the PMC /OWNER

All Medium and Critical Lift Plans shall include as a minimum the following information;

- Applicable crane load charts
- Elevation view drawing (to scale) of the crane, load and nearby structures or obstacles which could interfere with the lift.
- Lifting radius and boom length(s)
- All rigging equipment required to undertake the lift e.g. slings, lifting beams, shackles and any other special lifting device. The rigging equipment is also to be identified by length, location, capacity and size.
- Plan View Drawing (to scale) of the crane, load and nearby structures or obstacles
- which could interfere with the lift.
- Position of any transportation trailers.
- Initial pick radius of the load
- Final set radius of the load
- Crane route if the crane has to travel with the load.
- Applicable tail swing radius
- Crane matting requirements
- Identification of underground utilities that could affect the lift.
- Lift Data Sheets
- Equipment drawings confirming erection, shipping weights, location of centre of gravity and designated rigging attachment points.

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- Rigging/Heavy Haul Job Safety Analysis (RHJSA) Attachment A2 (to be completed prior to lift)
- Pre-Lift Safety Check-List Attachment A3 (to be completed prior to lift)
- Lift Plan Cover Sheet (Refer to Attachment 8)

6.3 LIFT PLAN VALIDITY

From the date of final approval all lift plans shall have a validity of 30 days after which the lift plan will expire. To re-validate the lift plan for a further 30 days it will require to go through the same signatory approval process as detailed in Section 6.2.

6.4 GENERIC LIFT PLANS

It is acceptable to use a Generic Lift Plan when there is repetitive lifting and the lift has fixed parameters. Examples of a Generic Lift Plan would be the offloading of Containers and Piping. For a lift plan to be a Generic Plan the following parameters must be followed;

- Maximum and minimum radius shall be specified
- Rigging configuration and rigging shall be the same for all lifts.
- Crane type and crane configuration shall not change.
- Location of the lift shall not change.
- A maximum lift weight shall be specified.
- Classification of lift shall be no higher than a 'Medium' lift.
- Generic Lift Plan validity shall follow Lift Plan validity requirements as detailed in section 6.3.

6.5 SUBMISSION OF LIFT PLANS

To enable sufficient time for the review and approval process all LSTK contractor lift plans require to be submitted seven days prior to the planned lift date.

7 CLASSIFICATION OF HAULAGE PLANS

This procedure is limited to any haulage to be performed within the Construction Site , including the equipment laydown area(s) . It excludes the transportation from the fabrication shop to the construction site.

The competent person planning the haulage shall refer to the haulage plan classifications in the following table to determine the classification of the haulage and to determine the amount of planning and documentation required.

7.1 HAULAGE PLAN CLASSIFICATION TABLE

Light Haulage	• Payload 0 tonne to less than 40 tonnes • Trailer operating at less than 75% of its capacity
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	- Width of trailer or load less than 4.5 meters - Length of trailer or load less than 14 meters
Medium Haulage	- Payload 40 tonne to less than 90 tonnes - Width of trailer or load 4.5 meters or greater - Trailer operating at 75% but less than 90% of its capacity - Angle of stability above 8 degrees to 12 degrees. - Length of trailer or load 14 meters to less than 20 meters.
Critical Haulage	- Payload 90 tonne or greater - Trailer operating at 90% or greater of its capacity - All hydraulic suspension 4 point arrangements - Angle of stability 5 degrees to 8 degrees. - Crossing over critical underground utilities - Carrying of loads with large sail areas - Using trailers with turntables - Any part of the trailer or load 3 meters or less laterally to any live and/or critical plant - Any part of the load to within 1 meter or less vertically of any piperack or overhead obstruction. - Length of trailer or load greater than 20 meters. - Any part of the load coming within 1 meter of the safe limit of approach of power lines
Notes	Any haulage that involves high cost or long lead items the lift may be reclassified to a higher haulage classification if management deem it necessary.

7.2 SIGNATORY APPROVAL & DOCUMENTATION REQUIREMENTS FOR HAULAGE PLANS

Light Haulage

No formal plan is required for a light haulage but any haulage activities shall be carried out by competent and trained people using approved safe transportation work practices at all times. A Rigging and Heavy Haul Job Safety Analysis shall be completed for all light haulage activities.

Medium Haulage

The haulage plan shall be prepared by the LSTK Site Rigging Engineer, Site Rigging Engineer and/or specialist subcontracted transportation company. All medium haulage plans shall be reviewed and approved by the Site Rigging Superintendent/ Supervisor and Site Rigging Engineer. In addition, LSTK contractor generated Medium Haulage Plans or their specialist subcontracted transportation company haulage plans shall be reviewed and approved by the PMC /OWNER

Critical Haulage

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The haulage plan shall be prepared by the LSTK Site Rigging Engineer and/or Senior Rigging Engineer, and/or specialist subcontracted transportation company. All Critical Haulage Plans shall be reviewed and approved by the Site Rigging Superintendent /Supervisor, Site Rigging Engineer, Site or Construction Manager. In addition, LSTK contractor generated Critical Haulage Plans or their specialist subcontracted transportation company haulage plans shall be reviewed and approved by the PMC /OWNER.

All Medium and Critical Haulage Plans shall include as a minimum the following information;

- Identification of underground utilities that could affect the haul activities and any additional measures to protect the underground utilities such as ground preparation, steel plates or wooden mats.
- A scaled drawing in plan view showing the travel path of the trailer and load including turning radius of trailer and any clearance requirements of existing or temporary or permanent facilities and any overhead power lines.
- A scaled drawing of the trailer configuration and load in plan, side and rear elevation view with complete dimensions of the load being carried and dimensions of the trailer. Payload centre of gravity to be clearly shown, crane angle, stability triangulation, trailer weight, payload weight, number of axles, weight per axle, weight per axles line, weight per tyre, shadow load and method of securing load on trailer.
- Equipment drawings confirming erection, shipping weights, location of centre of gravity.
- Rigging/Heavy Haul Job Safety Analysis (RHJSA) Attachment A2 (to be completed prior to any haulage.)
- Pre-Haul Safety Check-List Attachment A4 (to be completed prior to medium or critical haulage)
- Haulage Plan Cover Sheet (Refer to Attachment 9)

7.3 HAUL PLAN VALIDITY

From the date of final approval all medium and critical haulage plans shall have a validity of 30 days after which the haul plan will expire. To re-validate the haul plan for a further 30 days it will require to go through the same signatory approval process as detailed in Section 7.2.

7.4 SUBMISSION OF SUBCONTRACTOR HAUL PLANS

To enable sufficient time for the review and approval process all LSTK contractor haul plans require to be submitted seven days prior to the planned haul date.

8 GENERAL REQUIREMENTS

8.1 UNDERGROUND CONDITIONS AND GROUND PREPARATION

LSTK Contractor firstly required to confirm ultimate ground bearing capacities on a project. Certain areas may have particularly lower ground bearing pressures due to different ground conditions and the presence of underground services. Regardless of the classification of the lift all cranes are to be located on adequately prepared ground and crane mats or outrigger pads used so that the exerted ground bearing pressure are within acceptable limits.

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When particularly making medium or critical lifts the ground bearing pressures exerted during the lift needs to be compared to the allowable ground bearing capacity. This information needs to be established in the preliminary crane planning stages so any necessary ground improvement work can be planned and crane matting quantities established.

The above is also applicable to all heavy transportation activities and relocation of heavy lift cranes. It is essential that a detailed route survey is carried out for the trailer or crane which establishes any ground preparation and additional matting requirements.

8.2 WEATHER CONDITIONS

Wind

The majority of crane manufacturers have recommendations regarding the maximum permitted wind speeds which shall not be exceeded for the configuration the crane is operating in. If there is no information in the crane manual or load charts the permitted wind speeds shall be adhered to as detailed in 'Wind Speed Parameter Operational Guidelines' Attachment 7. All LSTK worksites shall have a weather station monitoring the wind speed and direction and this information shall be readily available to all site personnel when required. Cranes with a long boom configuration shall also be fitted with a wind speed indicator (Anemometer).

The following factors also need to be taken into consideration when operating in windy conditions;

- Assess how high the load is to be lifted as wind speed generally increases with height.
- If the load has a large sail area.
- What direction is the wind blowing. If the wind is blowing from the rear this can affect stability by blowing the load away from the crane, increasing the radius and placing additional load on the boom. The load can also be blown from vertical if the wind direction is blowing from the side.
- If the crane is operating between process equipment or buildings it could act as a 'wind tunnel'. The wind velocity can be increased as it blows around any of the obstructions and may exceed the crane operational permitted wind speed even though the general wind speed is acceptable.

Other Climatic Conditions

Other weather conditions can affect lifting activities such as cold weather, excessive heat, fog, rain, lightning or snow.

- Rain, snow or fog can obscure the load, the rigger giving hand signals and the tip of the crane boom making the lifting operations extremely hazardous.
- Extreme cold weather can also have a severe impact on lifting activities. In extreme cold temperatures, the crane and lifting equipment manufacturer shall be consulted regarding any lifting restrictions that require to be imposed.
- The presence of thunderstorms/lightning shall be monitored on site and distance parameters set at the start of the project as to when lifting operations must cease when

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a thunderstorm or lightning is approaching. If lifting operations must be ceased due to lightning the crane boom shall be lowered and/or retracted as much as possible and the rigging crew shall leave the work area.

- In excessive heat conditions the rigging crew can become quickly fatigued which can have an adverse effect on their work and safety performance. Rotating the rigging crew and regular breaks shall be considered when planning any prolonged lifting activities.

8.3 PRE-LIFT & PRE-HAUL MEETINGS

A Pre-Lift and/or Pre-Haul meeting shall be carried out for all Medium and Critical lifts/heavy hauls just prior to the lift/haul taking place. The Rigging Superintendent/Supervisor shall conduct the Pre-Lift and/or Pre-Haul meeting and all personnel involved in the lifting and/or haul activity shall be present. On completion of the Pre-Lift and/or Haul meeting the Pre-Lift and/or Pre-Haul Safety Checklist (Attachment A3 & A4) shall be completed and signed off by all personnel as confirmation they fully understand their roles and responsibilities.

For any light lifts the rigging crew and crane operator(s) shall have a Pre-Lift talk which discusses the lift addressing all issues including the method of communication between the Rigger (minimum level 2) and Crane Operator. In collaboration with the Crane Operator and Rigger the Daily Crane Operation Log (Attachment A1) shall be completed prior to different light lifts taking place. For light haulage activities, a Pre-Haul talk shall also take place as part of the Job Safety Analysis process.

8.4 RIGGING AND HEAVY HAUL JOB SAFETY ANALYSIS

It is a Technip requirement that all personnel involved in lifting and heavy haul activities regardless of classification complete a Rigging and Heavy Haul Job Safety Analysis (RHJSA) Attachment 2.

8.5 PRE-LIFT & PRE-HAUL CHECKS AND PREPARATION

For medium and critical lift and/or haul activities the LSTK Rigging Superintendent/Supervisor and/or Site Rigging Engineer shall inspect the load to ensure all the rigging equipment is set up as per the approved rigging plan or in the case of haul activities the trailer, load and transportation lashings are as per the approved transportation plan. For lifting activities, the lifting lugs and/or trunions and attachment welds shall be inspected by the Rigging Superintendent/Supervisor and/or Site Rigging Engineer prior to the lift. Tag lines shall be attached to the load to control it during the lift, the lift area barricaded and other work parties in close vicinity to the work area shall be advised the lift is taking place. Just before the lift or haul commences the Rigging Supervisor or Site Rigging Engineer must re-evaluate the weather conditions and confirm if the weather parameters do not have an adverse effect on the work activities.

For light lifts and light haulage activities the same procedure applies but they can be carried out by a Level 2 Rigger for light lifts and a deemed competent person in transportation for light haulage activities.

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8.6 MONITORING DURING EXECUTION OF THE LIFT OR HAUL ACTIVITIES

During a medium and critical lift and/or haul activity the LSTK Rigging Superintendent/Supervisor and/or Rigging Engineer shall continually monitor the activity and shall be vigilant that the lift and haul parameters do not significantly change. For light lifts a Level 2 Rigger can do the monitoring and a deemed competent person in transport operations can supervise light haul activities.

8.7 COMPLETION OF LIFT OR HAUL ACTIVITIES

When work is completed for all lift and haulage activities the Rigging Superintendent /Supervisor shall ensure all tag lines, rigging and temporary barricades are removed and the crane(s) and haulage equipment are either demobilized if no longer required or removed to a suitable holding area if required for further work.

8.8 RETENTION AND STORAGE OF LIFT AND HAULAGE PLANS

All lift and haulage plans shall be issued a project sequential reference number for tracking and retention purposes. All lift and haulage plans when completed including Job Safety Analysis, Pre-Lift and Pre-Haul Check Lists, Daily Crane Operation Logs shall be returned to the site rigging office and placed in suitable binders. On completion of the project they shall be submitted to PMC/OWNER.

8.9 PAYLOAD WEIGHT ACCURACY

To accurately verify the payload of a piece of equipment authenticated shipping manifests, manufacturing data and weighing by specialized calibrated equipment is the only reasonable way of confirming the payload accurately. Generally, weights confirmed by specialized calibrated equipment can be used without adding an additional safety margin but in other cases it is good practice to add 5% to 10% to the payload weight given in the manufacturing data when planning a lift. It shall also be verified that when vessels have been hydro tested that all water has been completely drained from the vessel before carrying out the lift.

Removal of an existing piece of equipment can pose the most difficult situation when you are trying to accurately verify the payload as the manufacturing data may no longer be available, additional weight could have been added since initial installation and residual process material could be inside the equipment. Considerable corrosion could have also taken place between the mating surfaces and even when all the location bolts have been removed additional load can be applied when the equipment is initially removed. Taking all these issues into consideration it is not an unreasonable approach to add an additional 20% to 25% to the payload of the existing piece of equipment you intend to remove.

8.10 USE AND CERTIFICATION OF RIGGING EQUIPMENT

All rigging equipment shall be used in accordance within manufacturer's recommendations, national and international recognized standards and never used beyond its design limits. No modifications shall be carried out to rigging equipment without the manufacturer's written approval. All rigging equipment shall have a valid test certificate, marked with a unique identification number traceable to the test certificate and marked clearly with its designed safe

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working load (SWL). In the case of Lifting or Spreader Beams or any other specialized lifting device where the weight is significant it shall also be marked clearly with its 'Tare Weight'. Regular inspections shall also be carried out and documented by a competent person in accordance with national and international recognized standards and available for review on site with the test certification records.

8.11 RIGGING EQUIPMENT MANAGEMENT

All rigging equipment shall be stored in one central location on site and shall be the responsibility of the Rigging Superintendent/Supervisor. Large slings and shackles shall be stored preferably in racks, smaller items in storage bins and in a dry, dust free environment. Synthetic slings shall be stored away from exposure to direct sunlight. A person competent in rigging shall be appointed to issue any rigging equipment from the rigging stores to only authorized field personnel and the rigging equipment shall be returned to the rigging stores in a timely manner when no longer required. Any rigging equipment found to be defective shall be appropriately tagged with a red label 'DO NOT USE' placed in a quarantine area and either repaired or destroyed as soon as possible.

8.12 PROCUREMENT OF RIGGING EQUIPMENT

One person competent in rigging shall be designated as the person responsible for the procurement of rigging equipment. All rigging equipment ordered shall conform to national and international certification standards and shall be supplied with original test and inspection documentation.

8.13 NIGHT TIME LIFTING AND HEAVY HAUL ACTIVITIES

Night time lifting and heavy haul activities (Medium and Critical) shall be avoided as much as possible but if necessary shall only be carried out in suitable flood lighting subject to approval of PMC/ OWNER, set up in advance and the 'lux' value recorded with a light meter before the lift and/or heavy activities commence. The artificial lighting shall provide sufficient light for all personnel so they have an accurate perception of the lift and/or haul activities with the elimination of shadows. All night time lifting and/or heavy haul activities shall be specifically addressed on the Job Safety Analysis (JSA) when it is prepared.

8.14 PICK AND CARRY OPERATIONS

For crawler cranes it is allowable to walk with a suspended load but the following recommendations shall be followed;

- Crane manufacturers recommendations are followed for pick and carry operations.
- Ground shall be level, compacted and matted to meet manufacturers' specifications.
- Crane travel speed shall not exceed manufacturers' recommendations.
- Avoid sudden stops and starts.
- Boom if possible shall be in the direction of the travel.
- Suspended load shall be kept as close as possible to the ground.
- A rigger shall walk with the crane to assist the crane operator.
- Any underground utilities or above ground obstructions to be identified prior to movement of the crane.
- Tag lines shall be attached to the load to control any swinging of the load during travel.

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As regards Rough Terrain and All Terrain Hydraulic Cranes travelling with a suspended load it is a more inherently hazardous procedure and requires extra precautions and as such no pick and carry operations shall be permitted using these types of cranes.

8.15 CRANES MOUNTED ON BARGES OR PONTOONS

Land based cranes may sometimes be mounted on barges or pontoons. For cranes operating under these conditions they will be subject to different loading conditions compared to cranes that are land based. Before a crane is put into service on a Barge or Pontoon the following must be complied with;

- Stability calculations shall be made by a competent person (e.g. Marine Engineer) to confirm the position and weight of the ballast. This is to determine that the barge or pontoon will not heel more than specified by the manufacturer. Stability calculations shall also be made by the competent person with the load over the stern, sides and front. (Some pontoons have tables for calculating the heel under different systems of loading these are available from the manufacturer.)
- After confirming the maximum load/working radius and length of boom the manufacturer shall provide the maximum heel at which the crane is safe to operate
- Any crane that is mounted on a barge or pontoon is a major modification which affects the stability and therefore the competent person must carry out a thorough test and examination before the crane is put into service.
- The stability of the barge or pontoon and the capacity of the crane must be taken into account when working in tidal waters.
- Guard rails must be installed.
- During icy conditions sand and salt must be used on the deck and also kept free of any oil or grease at all times.
- Compliance with any water authority by laws such as towing and mooring.
- No loads which are unauthorised are to be placed on the barge or pontoon which could have an effect on the stability.
- As soon as the crane is positioned on the barge or pontoon the load/radius information shall be modified to the calculated heel. To enable the safe load indicator to be adjusted to the true maximum heel (i.e. boom over the side) a load/radius curve requires to be plotted to confirm the loads can be safely applied at the specified radius.

8.16 CRANE AND EQUIPMENT ASSEMBLY

The delivery, offloading and assembly of any crane or piece of construction equipment are not exempt from these procedures. All component weights shall be known and classified

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accordingly so the necessary Lift Plan can be prepared and approved.

8.17 SITE INDUCTION

All site personnel involved directly or indirectly in lifting and haulage activities shall attend the 'Rigging and Heavy Haulage Induction' this includes but is not limited to the following people; Managers, Site and Area Superintendents, Rigging Engineers, Rigging Superintendents/Supervisors, Riggers, Crane Operators, Craft, Craft Supervision, Field Engineers and Logistics personnel. The aim of the induction is to cover LSTK Contractor procedural rigging and haulage requirements and rigging and heavy haulage safe work practices.

8.18 CRANE LIFTING FACTORS

Important note - Once the provisions of 6.1 have been met the cranes can be operated up to % capacities shown in table below.

Single crane static lift	90% SWL
Crawler crane travelling with load	85% SWL
Tailing operation	
Main crane –	90% SWL
Tailing crane -	90% SWL
Tandem Lifts	75% SWL each crane (see note 1)
Multi crane lifts (3 or more cranes)	80% SWL each crane

Note 1 – For cases where two cranes are required to lift a single load in unison at one position, each crane may be used up to 75% capacity once the equipment has been weighed and the COG position located. This shall only apply when the 'competent person' is satisfied that all relevant factors such as weight, centre of gravity, crane synchronisation, supervision, etc. have been accurately identified and monitored.

When all factors cannot be accurately evaluated, a minimum down-rating to 60% of chart capacity shall be applied. Where 3 or 4 cranes are involved the factors shall be reduced further as per table above.

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9.0 ATTACHMENTS

ATTACHMENT 1



DATE :	CRANE OWNER :
CRANE MAKE & MODEL :	CRANE SERIAL / I.D NO. :
OPERATOR :	PROJECT / AREA :

Lift No.	Payload Description	Boom Length	Boom Angle or Radius	Load Chart Capacity	Pay Load & Rigging Inspected	Weight Verified (Y) (N)	% of Chart Capacity	Approved By Crane Operator	Approved By Rigger
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

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ATTACHMENT2

Project _____

Area / Location _____

Company Name _____

Emergency Assembly Area # / Location _____



RIGGING AND HEAVY HAULAGE JOB SAFETY ANALYSIS			
Date and Time :	EMERGENCY NO :	Weather Conditions :	
Supervisor :	Task in Detail :	General Wind Direction :	
Contact No :	Location :	Fire Extinguisher :	
	Safety Shower / Eyewash Locations :	Colour Code :	
THESE STEPS INCLUDE AREA HAZARDS WHICH ARE REQUIRED TO BE COMMUNICATED WITH OTHER WORK PARTIES			
Basic Steps	Potential Risks	Preventive Measures / Safe Job Procedures	Tools / Equipment Needed
1)	1)	1)	1)
2)	2)	2)	2)
3)	3)	3)	3)
4)	4)	4)	4)
5)	5)	5)	5)
6)	6)	6)	6)
7)	7)	7)	7)
8)	8)	8)	8)
PLANNING CHECKLIST		YES	NO
REVIEW, COMMENTS AND NECESSARY ACTION			
A)			
B)			
C)			
Supervisor Comments :			

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ATTACHMENT 2 (CONTINUED)

RIGGING AND HEAVY HAULAGE JOB SAFETY ANALYSIS



Reviewed N/A		Reviewed N/A		Reviewed N/A	
Ground Conditions	<table border="1" style="width: 40px; height: 20px;"></table>	Fall Protection	<table border="1" style="width: 40px; height: 20px;"></table>	Vehicle & Mobile Equipment	<table border="1" style="width: 40px; height: 20px;"></table>
PPE	<table border="1" style="width: 40px; height: 20px;"></table>	Scaffolds, Ladder & Stairways	<table border="1" style="width: 40px; height: 20px;"></table>	Fire Prevention	<table border="1" style="width: 40px; height: 20px;"></table>
Slip / Trip / Fall	<table border="1" style="width: 40px; height: 20px;"></table>	Excavations & Trenches	<table border="1" style="width: 40px; height: 20px;"></table>	Communication of Hazards	<table border="1" style="width: 40px; height: 20px;"></table>
Tools & Equipment	<table border="1" style="width: 40px; height: 20px;"></table>	Lifting Equipment	<table border="1" style="width: 40px; height: 20px;"></table>	Permits	<table border="1" style="width: 40px; height: 20px;"></table>
Housekeeping	<table border="1" style="width: 40px; height: 20px;"></table>	Breathing Hazards	<table border="1" style="width: 40px; height: 20px;"></table>	Heat / Cold Hazards	<table border="1" style="width: 40px; height: 20px;"></table>

HAZARD CONTROL MEASURES											
PPE	Yes	N/A	Inspection:	Yes	N/A	Permit Requirements ?	Yes	N/A	Fall Prevention / Protection:	Yes	N/A
Hard Hat	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Rigging / Taglines	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Confined Space	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Guard Rails	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Ear Plugs	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Ladders	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Excavation	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Ladders	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Safety Glasses	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Hoses / Cords	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Work at height	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Rebar Caps	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Goggles	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Transportation Trailers	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Removal Platform / Gratings	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Floor Holes Covered	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Safety Footwear	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Harness / Lanyards/Safety lines	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Road Closure Notice	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Anchorage points	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Respirator/Mask	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Tools / tool lanyards	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Electrical / LOTO	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Other _____	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Face Shield	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Housekeeping	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Man Basket	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>			
Fall Protection	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Fire Extinguisher	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Hot Work	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>			
Gloves	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Barricades / Scaffold Tag	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Other _____	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>			
Other _____	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Payload	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>						

Environmental:	Yes	N/A	Environmental:	Yes	N/A	Training:	Yes	N/A	Training:	Yes	N/A
Spill Kits	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Dust Containment Plan	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Crane Operator	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Fall Protection	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Containment	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Dust Control	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Rigger	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Manlift	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>
Waste Disposal	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Other _____	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Signalman	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>	Electrical / LOTO	<table border="1" style="width: 40px; height: 20px;"></table>	<table border="1" style="width: 40px; height: 20px;"></table>

WE / I Accept Responsibility for Safe Work Actions and Environmental Issues. I will Promptly Report all Incidents to the Safety Department & my Supervisor

NAME / SIGNATURE & EMPLOYEE No.

Signature & Date _____
Foreman

NAME / SIGNATURE & EMPLOYEE No.

Signature & Date _____
Supervisor

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ATTACHMENT 3

PRE-LIFT MEDIUM AND CRITICAL SAFETY CHECKLIST



Performing Company :		Lift Date / Time :	
Payload Name :			
Equipment Number :		Rigging Drawing Number :	
Verified Weight of Payload		Dimensions of Payload: (L) X (W/ Ø) X (H)	
Make & Model of Crane(s) :		Equipment Number of Crane(s)	
Weather Conditions/Wind Speed :			
1	Lift Plan Classification. ☐ Medium Lift ☐ Critical Lift		
2	Final Check of Crane(s) ☐ Crane(s) set up & located as per approved rigging plan ☐ Radius from crane(s) center of rotation to payload checked ☐ Boom length(s) & number of line parts in hook block(s) is correct ☐ Underground utilities verified & protection installed as required ☐ Crane(s) set-up on mats if required (Verify size & quantity) ☐ Crane(s) on even level and compacted ground ☐ Safe working distance from power lines verified ☐ Crane travel paths (where applicable) leveled & compacted and matted where specified		
3	Final Check of Crane(s) Hook Block(s) & Rigging ☐ Slings are seated correctly in the hook block(s) ☐ Hook block(s) have safety catches fitted & are functioning correctly. ☐ Correctly rated Slings selected are as per rigging plan ☐ Correct Spreader Bar/ Lifting Beam is used (if required) ☐ Correct size shackles are installed ☐ Softeners provided at rigging bearing points (where req'd) ☐ All rigging equipment is certified and has correct colour code ☐ Tag Lines attached to control payload		
4	Safety measures and communications verified : ☐ Job safety analysis (JSA) ☐ Personnel Safety & tail swing barricades installed ☐ Only authorized personal in area ☐ Crane(s) have valid third party certification. ☐ Proper PPE used ☐ Required permit in place? ☐ Lift, travel & swing area clear ☐ Crane(s) Daily Check List with Crane Operator ☐ Crane's or alternate air horn available ☐ Radio communication required ?		
5	Operator(s) and Rigging Superintendent ☐ Operator(s) Name : ☐ Operator is Certified : ☐ Rigging Superintendent / Supervisor(s) Name ☐ Rigging Superintendent / Supervisor(s) Certified :		
6	Does the actual rigging procedure differ from the approved rigging plan ? ☐ Yes ☐ No If yes, explain why : 		
7	A detailed final description of the planned sequence of the lifting operation was discussed with ALL people involved in the lift ? ☐ Yes ☐ No If no, explain why, or if yes and there were any comments from the pre-lift discussion that should be noted : 		

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ATTACHMENT 4

PRE-HAUL MEDIUM & CRITICAL SAFETY CHECKLIST

Company Performing Work:		Haul Date and Time :	
Payload Name :			
Equipment Number :		Haulage Drawing Number :	
Verified Weight of Payload :		Dimensions of Payload: (L) X (W/ Ø) X (H)	
Make/ Model of Trailer and/or Prime Mover :			
Weather Conditions/Wind Speed :			
1 Classification of Haul Plan ☐ Medium ☐ Critical			
2 Final Check of Trailer / Payload & Documentation			
☐ Payload weight verified. ☐ Payload configured on trailer as per approved transportation - drawing.			
☐ Trailer configured as per approved transportation drawing. ☐ Transportation supports / saddles checked and verified.			
☐ Lashing & securing arrangements verified. ☐ Transportation plan is approved and has all the required approval signatures.			
☐ Trailer valve positioning checked and verified.			
☐ Center of gravity on payload clearly marked and - verified.			
3 Final Check of Haulage Route			
☐ Intended route has been identified and approved. ☐ Clearances to existing and temporary facilities verified.			
☐ Underground utilities verified and protection installed as required.			
☐ Safe working distance from power lines verified.			
☐ Travel route is level compacted and matted where required.			
4 Safety measures and communications verified :			
☐ Job safety analysis (JSA) ☐ Escorts in place to ensure safe movement of the load. ☐ Method of communication verified.			
☐ Personnel barricades are installed where required on route. ☐ Proper PPE used			
☐ Any required permits are in place. ☐ Road closure and traffic management plan in place.			
5 Trailer Driver(s) / Operator(s) and Person in Charge			
☐ Trailer Driver(s) / Operator(s) Name : ☐ Person in Charge of Haul Activities			
Name : Name :			
6 Does the actual haulage procedure differ from the approved haulage plan ?			
☐ Yes ☐ No If yes, explain why :			

7 A detailed final description of the planned sequence of the haulage activities was discussed with ALL individuals - involved in the haulage ?			
☐ Yes ☐ No If no, explain why, or if yes and there were any comments from the discussion that should be noted :			

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ATTACHMENT 5

LIFT PLAN (SINGLE CRANE)					
1	Project Title:				
	Performing Party :		Operating Party:		
	Area :	Area Incharge:	Lifting Date :	Time:	
	Lift Permit No.:	Review. By:	Aprd. By:	Date :	Time:
	Lifting Study No.:	Prepared By:	Aprd. By:	Rev.:	
	Reference Drawing Number:				
	Primary Units:	Metric (m - Te)	Dimensions:	m	Weight: Te
	Lifting Crane Description and Details :-				
	Manufacture:	Model No.:		Year of Manuf.:	
	Type of Crane:	Telescopic	Type of Boom:	Lattice	Crane Configuration:
Crane CWTs.:	Hook Block Type:		Main Hook Block	Hook Block Cpy.	
Main Boom Length:	CWTs. (Carbody):		Parts of Line:		
Jib Type:	Erected - Not Used	Super Lift CWTs.:	Rope Size (Dia/ Ø): mm		
Jib Length:	Superlift Type:		Cwt. Tray	Single Line Pull Cap'y:	
Jib Offset (Degrees) :	°	Superlift Radius:	% of Line pull Cap'y: 0.00%		
3	Pay Load Description:				
	Lifting Description and Details :-				
	Pay Load Details	Dimension (LxW/ ØxH)	Quantity	Weight Each	Total Weight
	Total Pay Load to be lifted (Without Rigging)				
	4 Rigging Equipment Description				
	Capacity (SWL)	Quantity	Weight Each	Total Weight	
Total Weight of Rigging Equipment					
5	Gross Capacity Deductions :				
	Main Hook Block:	Main Hoist Line:	Auxiliary Hoist Line:		
	Auxiliary Hook Block:	Jib:	Enter Deduction		
	Aux. Boom Sheaves:	Other (Specify):			
	Total Capacity Deductions:		0.0	Te	
6	Crane Capacities (Net):				
	Planned Radius for Lifting :	Radius 1	Radius 2	Radius 3	
	Load Chart Radius Used :				
	Chart Capacity:				
	Pay Load:				
	Rigging Equipment Weight:				
	Capacity Deduction:				
	Total Load to Lifting Crane :				
	Max Percentage (%) Capacity Used:	0.00%			
	7	Classification of Lift			
No					
8	Supporting Information :				
	Ground Bearing Pressure:	Actual	Te/m ²	Allowable	Te/m ²
9	NOTES /COMMENTS :				
10	Final Approvals:				
	Name		Signature	Date:	Time:
	Rigging Superintend (Perform. Party):				
	Rigging Engineer(CONTRACTOR):				
	Senior Rigging Engineer:				
Area / Construction Manager:					

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ATTACHMENT 6

LIFT PLAN (TWO CRANE TANDEM OR UPENDING LIFT)										
1	Project Title:									
	Performing Party :				Operating Party:					
	Area :		Area Incharge:		Lifting Date :		Time:			
	Lift Permit No.:		Review. By:		Aprd. By:		Date :		Time:	
	Lifting Study No.:		Prepared By:		Aprd. By:		Rev.:			
	Reference Drawing Number:									
	Primary Units:		Metric (m - t.)		Dimensions:		m.		Weight: kgs	
	2 Lifting Crane Description and Details :-									
	Head Crane (Main Crane)					Tailing Crane (Supporting Crane)				
	Manufacture:					Manufacture:				
	Model No.:					Model No.:				
	Year of Manuf.:					Year of Manuf.:				
	Type of Crane: Crawler					Type of Crane: Telescopic				
	Type of Boom: Telescopic					Type of Boom: Telescopic				
	Crane Configuration: S-Main boom only					Crane Configuration: S-Main boom only				
Main Boom Length:					Main Boom Length:					
Jib Type: Not Applicable					Jib Type: Not Applicable					
Jib Length:					Jib Length:					
Jib Offset: Degrees					Jib Offset: Degrees					
Crane CWTs.:					Crane CWTs.:					
CWTs. (Carbody):					CWTs. (Carbody):					
Superlift Type: Not Used					Superlift Type: Not Used					
Super Lift CWTs.:					Super Lift CWTs.:					
Superlift Radius:					Superlift Radius:					
Hook Block Type: Main Hook Block					Hook Block Type: Auxiliary Hook Block					
Hook Block Cap'y:					Hook Block Cap'y:					
Parts Line:					Parts Line:					
Rope Size (Dia/Ø): mm					Rope Size (Dia/Ø): mm					
Single Line Pull Cap'y:					Single Line Pull Cap'y:					
% of Line pull Cap'y: 0.0% Tandem 0.0% Install					% of Line pull Cap'y: 0.0%					
3	Pay Load Description:									
	Lifting Description and Details :-									
	Total Pay Load to be lifted (Without Rigging)									
4	Rigging Equipment Description									
	Head Crane (Main Crane)					Tailing Crane (Supporting Crane)				
	Description	Qty.	Wt.each	Total Wt.	Description	Qty.	Wt.each	Total Wt.		
	Total Weight of Rigging Equipment:				Total Weight of Rigging Equipment:					
	5	Capacity Deductions :								
Head Crane (Main Crane)					Tailing Crane (Supporting Crane)					
M. Hook Block:		M. Hoist Line:		M. Hook Block:		M. Hoist Line:				
Auxiliary Block:		A. Hoist Line:		Auxiliary Block:		A. Hoist Line:				
Aux. Boom Sheaves:1				Aux. Boom Sheaves:						
Jib: Not Applicable				Jib: Not Applicable						
Other (Specify):				Other (Specify):						
Gross Capacity Deductions :					Gross Capacity Deductions :					

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ATTACHMENT 7

RECOMMENDED WIND SPEED LIMITS FOR CRANE OR LIFT OPERATION								
Wind Force level		1	2	3	4	5	6	7
Wind Speed (m/s)				3.4 - 5.4	5.5 - 7.9	8.0 - 10.7	10.8 - 13.8	13.9 - 17.1
(km/hr)				11.1 - 17.7	18.0 - 28.8	28.9 - 39.6	39.7 - 50.4	50.5 - 75.6
(mph)				6.9 - 11.0	11.2 - 17.9	18.0 - 24.6	24.7 - 31.3	31.4 - 38.0
Description of crane lift activity								
Tower crane assembly, jacking and dismantling work.				A	B	C		
All tank jack-up work				A	B	C		
All lifting/ tank erection work with sail area (e.g. tank shell plate, panel etc) based on work height and controllability.					A	B		
All other general lifting activities						A	B	
All critical lifts.					A	B		
Type of crane configurations at work								
Cranes with 50m or longer boom/jib configuration.					A	A	C	
Cranes with less than 50m boom/jib configuration.						A	B	C
Tower crane lift operation						A	B	C
Hydraulic crane operation with short telescopic boom (less than 20m)						A	B	C
Wind Force level		1	2	3	4	5	6	7

LEGENDS:

A	NOTIFICATION TO CRANE USER OR SUPERVISOR TO EXERCISE CAUTION AND VIGILANCE IN LIFT. LIFT OPERATION MAY PROCEED SUBJECT TO FIELD JUDGEMENT BY SUPERVISOR/OPERATOR/RIGGER
B	LIFT OPERATION TO CEASE
C	IMPLEMENT MEASURES AGAINST HIGH WIND

E.G : TOWER CRANE TO FREE SLEW OR ALIGN AND TIE AGAINST SUITABLE SUPERSTRUCTURE.

CRANES WITH LONG LATTICE BOOM/JIB LOWERED TO GROUND. HYDRAULIC CRANE TO BE IN PARKED POSITION. CRANE MANUFACTURER RECOMMENDED MEASURES TO APPLY.

CRANES WITH LONG LATTICE BOOM/JIB LOWERED TO GROUND AS FAR AS POSSIBLE. HYDRAULIC CRANE TO BE IN PARKED POSITION.

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 	PROJECT		Standby SRU & Additional Tanks IOCL Paradip Refinery	
	CLIENT		INDIAN OIL CORPORATION LIMITED	
JOB SPECIFICATION FOR RIGGING, HAULAGE & HEAVY LIFT	Project No. 080557C001	Document No. 080557C-000-JSC-0000-001	Rev. No. 0	Page 34 of 35

ATTACHMENT 8

LIFT PLAN – COVER SHEET	
Project :	
Location/Area :	
Payload :	
Description of Lift :	
Lift Classification :	
Lift Plan Ref No. :	
Revision No. :	

Lift Plan Approval Signatures

	Signature	Date	Classification
Rigging Superintendent/Supervisor Contractor Name :			
Site Rigging Engineer-Contractor Name :			
Site/Construction Manager-Contractor Name :			
Technip / Owner Name :			

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ATTACHMENT 9

HAUL PLAN – COVER SHEET	
Project :	
Delivery Location/Area :	
Payload :	
Description of Haulage :	
Haul Classification :	
Haul Plan Ref No. :	
Revision No. :	

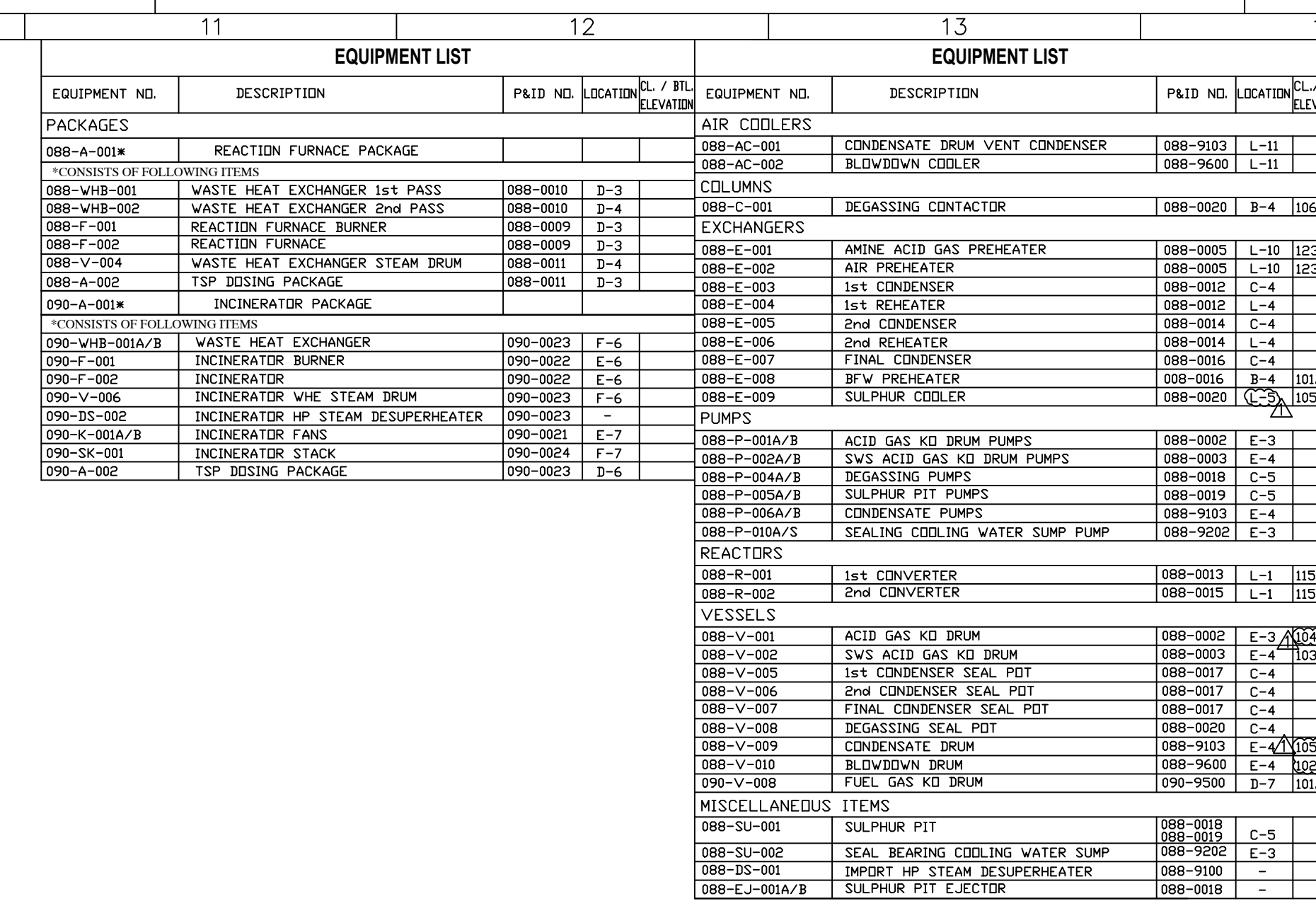
Haul Plan Approval Signatures

	Signature	Date	Classification
Rigging Superintendent/Supervisor- Contractor Name :			
Site Rigging Engineer- Contractor Name :			
Site/Construction Manager-Contractor Name :			
Technip / Owner Name :			

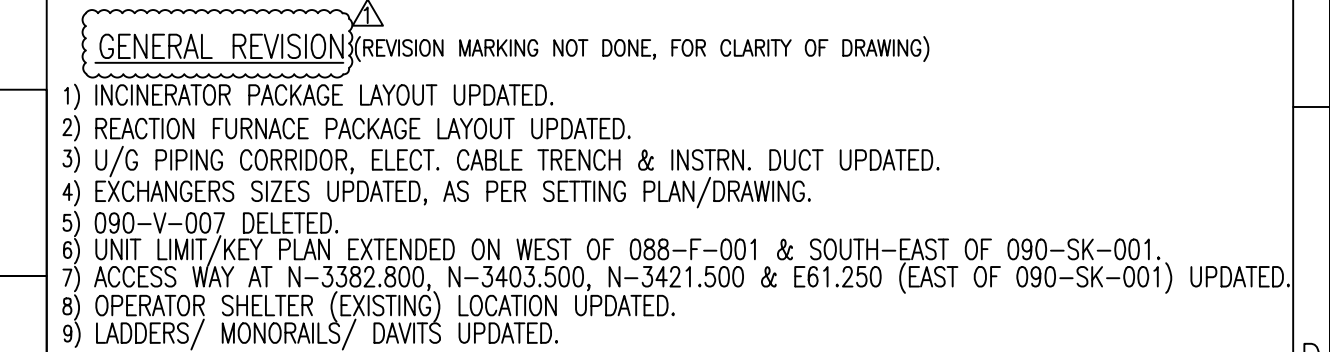
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DOCUMENT CATEGORY		DOCUMENT REVIEW STATUS (BY CLIENT)				
(USE "X" MARK)						
☒ APPROVAL ☐ REVIEW ☐ INFORMATION						
			AG	AV	LSJ	
1	15.03.2022	REVISED & ISSUED FOR ENGINEERING	AG	AV	LSJ	
0	08.06.2021	ISSUED FOR ENGINEERING	AG	AV	LSJ	
REV	DATE	DETAILS OF REVISION	PREPARED	CHECKED	APPROVED	
CLIENT	 IndianOil	INDIAN OIL CORPORATION LIMITED PARADIP REFINERY PROJECT PARADIP ODISHA				
CONSULTANT			TECHNIP ENERGIES			
PROJECT	525 TPD STANDBY SRU PROJECT IOCL PARADIP REFINERY, ODISHA, INDIA					
ESC						
	BHEL Hyderabad	NAME	SIGN	DATE		
		DRN				
		CHD				
DEPT. PE&SD.	CODE 450					
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company		TITLE- UNIT PLOT PLAN STAND BY SRU-3 & TAIL GAS INCINERATOR				
		BHEL/EIL DRG NO.- B366-088-16-43-00001				REV
		CUST. DRG NO.- 080557C-26899053-PIP-A0201-001				1
		SHT NO.- 1 of 2	NO. OF SHT.- 2			



REF. DWG. NO.		REFERENCE DRAWING TITLE	
088557-C00-DWG-0031-001		OVERALL SITE PLAN	
NOTES :- 1. ALL DIMENSIONS ARE IN MM. AND COORDINATES ARE IN M. UNLESS OTHERWISE SPECIFIED. 2. ALL ELEVATIONS ARE IN M. AND ARE WITH REFERENCE TO HIGHEST POINT OF PAVEMENT EL. 100.300M WHICH CORRESPONDS TO 4.360M ABOVE 1 M.S.L. (INDIAN MEAN SEA LEVEL). 3. EXISTING FACILITIES LIKE CENTRAL PIPE RACK, OWS PIT, OPERATOR SHELTER, CABLE TRENCH/CHTRY ETC. ARE SHOWN FOR REFERENCE. FOR DETAIL, REFER EXISTING DRAWINGS. 4. IN-LINE EQUIPMENTS LIKE EJECTOR, DESUPERHEATER ARE NOT SHOWN. 5. DELETED Δ 6. REFER INSTRUMENT DUCT LAYOUT DWG NO. 8366-999-16-51-00801 FOR INSTRUMENT CABLE DUCT AND ANALYSER PANEL / SHELTER DETAILS. 7. FOR ELECTRICAL CABLE DETAILS REFER RESPECTIVE ELECTRICAL DRAWINGS. 8. FOR STRUCTURAL DETAILS REFER RESPECTIVE STRUCTURAL DRAWINGS. 9. FOR INCINERATOR PACKAGE, REFER VENDOR DRAWING "GENERAL ARRANGEMENT INCINERATOR SYSTEM (2443-INC-DCI-029)". HOLDS: 1. PUMPS DIMENSIONS 2. 088-AP-001, 002 & 098-AC-001 DIMENSION Δ			



LEGENDS:

AG	ABOVE GROUND
UG	UNDER GROUND
TS	TECHNOLOGICAL STRUCTURE
WP	ELEVATION
VP	WORKING POINT
PR	PIPE RACK
F.S.	FIXED SADDLE
S.S.	SLIDING SADDLE
PLTF.	PLATFORM
RL	REDUCED LEVEL
MSL	MEAN SEA LEVEL
CL	CENTER LINE
H.P.	HIGHEST POINT OF PAVEMENT
FGL	FINISHED GRADE LEVEL
TDS	TOP OF STEEL
N.TS	NOT TO SCALE
NW	MILLIMETER
M	METER
 EWSS	EYE WASH & SAFETY SHOWER
	PAVING
	GRATING
	EXISTING FACILITY / STRUCTURE

