

2009

PETROLCOMET HEALTH, SAFETY & ENVIRONMENT PLAN







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DEFINITION OF TERMS

Accident

An unplanned or undesired event that can result in harm to people, property or the environment.

Exposure

The measurement of time during which the subject is at risk from a hazard.

FAT

Factory Acceptance Testing

Fatality

Death due to a work related incident or illness regardless of the time between injury or illness and death.

Harm

Includes death, injury, physical or mental ill health, damage to property, loss of production, or any combination of these.

Hazard

A source or a situation with a potential to cause harm, including human injury or ill health, damage to property, damage to the environment, or a combination of these.

Housekeeping

Maintaining the working environment in a tidy manner.

HSE

Health, Safety and Environment.

Incident

An event that: -Results in death or injury to person where the injury requires medical attention (including first aid); -Results in injury/damage to persons, property or process; -Is not in compliance with statutory requirements, safe work procedures or in-house guidelines.



Interface Document

A document that clearly identifies how the Owner's HSE expectations and the Shipyard's HSE management systems will be interlinked during the work program.

Lost Time Injury (LTI)

Work related injury or illness that renders the injured person unable to perform any of their duties or return to work on a scheduled work shift, on any day immediately following the day of the accident.

Medical Treatment Case (MTC)

Work related injury or illness requiring more than first aid treatment by a physician, dentist, surgeon or registered medical personnel.

MSDS

Material Safety Data Sheet

Near Miss

A Near Miss is an event where no contact or exchange of energy occurred and thus did not result in personal injury, asset loss or damage to the environment.

Personal Protective Equipment (PPE)

All equipment and clothing intended to be utilized, which affords protection against one or more risks to health and safety. This includes protection against adverse weather conditions.

Restricted Work Case

Work related injury or illness that renders the injured person unable to perform all normally assigned work functions during a scheduled work shift or being assigned to another job on a temporary or permanent basis on the day following the injury.

Risk

A measure of the likelihood that the harm from a particular hazard will occur, taking into account the possible severity of the harm.

Risk Assessment

The process of analyzing the level of risk considering those in danger, and evaluating whether hazards are adequately controlled, taking into account any measures already in place.



Risk Management

The process of identifying hazards, assessing risk, taking action to eliminate or reduce risk, and monitoring and reviewing results.

Contractor

Petrolcomet Services

Training

The process of imparting specific skills and understanding to undertake defined tasks.

Unsafe act or condition

Any act or condition that deviates from a generally recognized safe way or specified method of doing a job and increases the potential for an accident.

SWL

Safe Working Load.

Work Program

The work being undertaken by a site on behalf of the Company.

Worksite

The premises where any building operations or works of engineering construction related to the work program are being carried out.



1. SCOPE

This plan covers the requirements of the accident prevention rules and safety program to be applied to the contraction work for Oil and Petrochemical Company Projects that will be performed by the Construction Contractor under the supervision of Owner Company. The primary purpose of this plan is to provide a guideline for preventing any accidents which may injure Employees or damage property of the Owner, Contractor and his Construction Subcontractors (hereinafter called Subcon) at the construction site. Contractor shall abide by all safety rules and other regulations imposed at the site by the Laws of the country and the provisions of applicable laws, rules and regulations, including rules and procedures as applicable from the Owner.



2. ORGANIZATION

- 2.1. General the safety requirements stipulated in this plan shall be strictly met and maintained by the safety organization at construction site.
- 2.2. Safety Committee
- 2.2.1. Contractor shall organize a safety committee consisting of Contractor's Site Manager, Contractor's Safety Manager, and the Subcon's Field Safety Manager.
- 2.2.2. Safety Committee shall:
- Monitor and ensure the operation of safety program in a proper manner.
 - Direct, coordinate and orient the safety activities.
 - Promulgate the spread of policy, objectives, rules and/ or regulations.
 - Look for, detect, and identify risky conditions.
 - Perform a thorough investigation of all accidents and review the recommendations to avoid any repetition of the accident.
- 2.3. Responsibility
- 2.3.1. Contractor's Site Manager shall:
- Have the prime responsibility for ensuring the site safety.
 - Establish a realistic safety policy and safety targets for the site.
 - Promote the setting up of safety plan, regulations and rules and of a safety training plan, etc.
 - Organize and preside over safety committee.
 - Direct the Subcon's construction Manager, Field Safety Manager and other managers in carrying out their duties and responsibilities.
- 2.3.2. Contractor's Safety Manager shall:
- Chair a weekly safety committee meeting.
 - Coordinate the safety activities between the Owner and Construction Subcon.
 - Review and approve the Construction Subcon's safety program and procedures, advise and recommend any corrective actions necessary.
 - Conduct periodic safety audits to ensure that the established safety program is implemented in a proper manner for construction work.
- 2.3.3. Subcon's construction Manager shall:
- Be responsible for all safety activities, including fire prevention during the construction period.
 - Organize the safety committee.
 - Submit a safety program including safety measures for the work to the Field Safety Manager prior to commencement of the work.
 - Establish, implement and maintain the safety program through the Safety Supervisor and Workers.
 - Conduct independent audits to assure conformance with the established safety program and determine the effectiveness of individual elements of the program.



2.3.4. Subcon's Field Safety Manager shall:

- Conduct daily safety four report to Contractor.
- Conduct a safety program under the direction of the Construction Manager.
- Patrol the work site periodically to verify that the work is carried out under safe conditions, with no violations of safety requirements.
- Advise promptly the Construction Supervisors and Workers of corrective action when any unsafe conditions or violations are observed.
- Check each work procedure from the safety point of view and advise the Construction Supervisors before commencement of work and, or while working.
- Submit accident report to Contractor Safety Manager and Owner's representative.
- Maintain the published safety literature, safety regulations, codes and other communications in accordance with contract. Advise management of compliance and conditions requiring attention.
- Make thorough analysis of the statistical data through inspection, delineate problem areas, and make recommendations for solutions.
- Check on the use of all types of personal protective equipment, evaluate effectiveness and suggest improvements.

2.3.5. Subcon's Supervisor/ Foreman shall:

- Organize sites so that the work is carried out in accordance with the safety standards required for the minimum risk to employees and property.
- Know the safety requirements stipulated in the safety program.
- Give precise instructions as to the requirements for correct work method.
- Coordinate with his Subcons to avoid any confusion about areas of responsibility.
- Make sure that suitable personal protective equipment is available and in use.
- Ensure that new employees are properly instructed in precautions to be taken before they are allowed to start work.

2.3.6. Subcon's Worker shall:

- Do nothing to endanger himself or coworkers.
- Use the correct tools and equipments for the job.
- Keep tools in good condition.
- Use proper personal safety equipment provided at all times.



3. SAFETY REPORTS/MEETINGS AND NOTICES

3.1. Accident Reports

3.1.1. All accidents are to be immediately reported orally to the supervisor in the cases described below and will be followed by a written report.

- All fatal injuries.
- All injuries requiring first aid treatment.
- All damages, to the Owner's or Contractor's properties.
- All fires.
- All releases or spills of hazardous materials.

3.1.2. A written accident report shall describe in detail the circumstance, and include the results of the accident investigation and analysis. This report describes the accident classification, cause, time, date, location, etc. Written incident reports shall be submitted to Safety Manager and Owner's representative through Contractor within 12 hours.

3.1.3. A daily first aid record must be kept on all employees requiring first aid treatment.

3.2. Safety Committee Meeting

3.2.1. A safety committee meeting shall be held on a weekly basis and chaired by the Contractor's Safety Manager and attended by all Safety Committee members.

3.2.2. All Safety Committee members prior to holding a meeting shall conduct a joint site safety inspection and the inspection results shall be discussed at the meeting.

3.3. Notice for Corrective Actions

3.3.1. If the Construction Subcon fails or refuses to fulfill his safety responsibility or to correct unsafe conditions or practices, he will be ordered by Contractor to take the necessary corrective action.

3.3.2. When any negligence of safety and/ or unsafe practices are detected, Contractor shall immediately advise and or instruct the Construction Subcon to correct them.

3.3.3. If the Construction subcon fails to heed the instruction or advice or neglects fire precautions described in the work permit, Contractor shall issue the letter of instruction for corrective action to the Construction Subcon. The unsafe work will be stopped. The work will not commence again until corrective action has been taken.

3.3.4. Daily safety inspections Daily safety tour shall be made by Subcon's Field Safety Manager who will record and submit 1 copy of the daily safety check list to the Contractor's safety Manager.



4. SAFETY ORIENTATION AND EDUCATION

- 4.1. It is mandatory for each employee to attend the Safety Orientation program on his first day of work. No worker will be permitted to work on the site without attending the Safety Orientation Program and attached safety requirements.
- 4.2. The orientation will be given by the Subcon's Field Safety Manager and must include followings:
 - Brief explanation of the program.
 - Safety/ Security control policy.
 - Outlines of applicable regulations and requirements for the project.
 - Emergency procedures.
 - First aid services.
 - Each worker's responsibilities.
- 4.3. Biweekly Monday morning (2 times per month) before start of work a safety education is held by the Subcon's Field Manager for all workers and staffs and the record of safety education shall be kept and maintained by the Subcon.
- 4.4. Every morning before start of work a safety talk session is held by the Supervisor with the foremen of each work place to instruct and discuss:
 - Work procedures.
 - Safety instructions for using equipment and tools.
 - Particular hazardous conditions and precautions to be taken.
 - Workmen's health conditions and other required information.
- 4.5. A written record will be maintained on all employees stating that they have received the safety training and fully understand the rules and regulations. This form will be signed and dated by each employee and kept on file in the subcon's safety Department for auditing and other relevant purposes.
- 4.6. Periodic updating of the safety training procedure and requirements is provided for supervisors and foremen every two or three month.



5. GENERAL PLANT REGULATIONS

- 5.1. Employee Requirements All employees must be in good physical condition, i.e. appear healthy, have adequate hearing and sight, possess all limbs, do not suffer from vertigo, etc.
- 5.2. Vehicles and Equipment
- 5.2.1. Employees will comply with all safety rules and signs regarding traffic and vehicle use. Vehicles must be parked only in areas approved by Contractor.
- If these areas include factory roadways, vehicles must only park on the sidewalk that traffic signs allow parking. Without such traffic signs, parking is prohibited. This is to permit access of emergency vehicles at all times.
- 5.2.2. Speed limit within the site is controlled according to site and road condition, but must not exceed maximum 40 km/h.
- 5.2.3. All equipment, machinery and tools for use on the job site must be approved by Contractor, and shall be subject to initial and periodic inspection by Contractor, Any equipment, machinery and tools, which have not been approved, must be removed from the site.
- 5.2.4. The engines of all vehicles and equipment should be stopped during refueling.
- 5.3. Alcohol and/ or Controlled Drugs
- 5.3.1. Alcoholic drinks and / or Controlled Drugs are not to be used or allowed on the site at any time.
- 5.3.2. Anyone found under the influence of, or in possession of, alcohol or Drugs will be immediately removed from the site and refused future access.
- 5.4. Smoking
- 5.4.1. Smoking is not permitted except in specified areas of workshops and buildings, Temporary buildings used may be Contractor approved smoking areas under special permits. Smoking in vehicles on the site is not permitted.
- 5.4.2. Smoking is not permitted in any building under construction.
- 5.4.3. Smoking is not allowed in the plant except certain designated area.
- 5.4.4. Matches and lighters are not allowed in the plant. Cigarette butts should be discarded only in proper receptacles.
- 5.5. Safety Signs
- 5.5.1. Contractor's Subcons and all personnel shall observe the requirements of all safety signs on site.
- 5.5.2. Contractor, Subcons and all personnel will not remove any safety chain Barrier, tag, marking or sign unless so directed by the proper authority.
- 5.6. Holographic Equipment and Radios
- 5.6.1. Holographic equipment (camera, video, etc.) are not permitted on the site without prior approval in writing from Owner.
- 5.6.2. The use of transistor radios, two-way radios, mobile telephones and pack link system inside the plant is not permitted until approved by Contractor and Owner.



5.7. Time Keeping

5.7.1. When Subcon wishes to work before or after regular hours, weekends and or Public Holidays, he must have authorization from Contractor.

5.8. Environmental Control

5.8.1. The Construction Subcon is responsible for the environmental control specified for the job site including all equipment and machines used.

5.8.2. Do not dispose of any used oil or liquid waste direct to the ground, pit or storm drain. Dispose of these materials only in properly labeled containers.



6. PERSONAL SAFETY EQUIPMENT

6.1. General

6.1.1. Construction Contractor and Subcon is totally responsible for providing personal protective equipment for the protection of their employees as needs or requested.

It is also the Construction Subcon's responsibility to ensure that his employees are well trained and use properly the personal safety equipment at all time in the Site and out of site while working.

6.1.2. All tools and equipment are required to be maintained in good working condition. The Safety Supervisor shall inspect all tools and equipment periodically.

6.2. Head Protection

6.2.1. Safety hats or helmets are rigid headgear made of various materials and designed to protect the head from impact, flying particles, electric shock, or any combination of the three. Each helmet has two parts, a shell and a suspension cradle.

6.2.2. Any modification of the safety helmet, especially punching holes in shell, is prohibited.

6.3. Eye and Face Protection

6.3.1. Protection of the eyes and face from physical or chemical agents are of prime importance in an industrial environment. And also, due to intensive sun exposure, uncontrolled dust and high humidity, locally used cotton Scarf should be issued to open area workers during construction period.

6.3.2. To select the type of protection will depend on the properties of possibly imposed hazard, but it should be borne in mind that all eye protection and most face protection devices must be considered as optical instruments. They must be selected, fitted, and used with regard to both the type of hazard and the optical condition of the user.

6.3.3. Industrial grade safety glasses (with shield) required at all times during working hours in shop or in construction site.

6.3.3.1. Welding and cutting

6.3.3.2. Excavation

6.3.3.3. Driving nails

6.3.3.4. Grinding

6.3.3.5. Drilling

6.4. Hand protection

6.4.1. The kind of gloves used depends primarily upon the material or equipment being handled.

6.4.2. Gloves should not be used near rotating machinery as they can be caught and trap the hand.

6.4.3. Suitable gloves should be worn on most construction work.



6.5. Food Protection

6.5.1. The safety shoe or boot is fitted with a metal toecap. The toecap is capable of withstanding both compression and impact loads.

6.5.2. Safety footwear for construction work must be able to withstand a compressive load of 1,100 kg and an impact load of 33 kg.

6.5.3. Foot guards must be worn when using jack hammers, tampers and similar equipment.

6.6. Safety Belts (or Harness), Lifelines and Lanyards should be worn while working elevation is 3 m high from ground or platform level.

6.6.1. Lifelines, safety belts, and lanyards shall be used only for worker safeguarding. Any lifeline, Safety belt, or lanyard actually subjected to in-service loading, as distinguished from static load testing, shall be immediately removed from service and shall not be used again for worker safeguarding.

6.6.2. Lifelines shall be secured above the point of operation to an anchorage or structural member.

6.6.3. Safety belt lanyard shall be a minimum of 14mm nylon, or equivalent, with a proper length of falling distance no greater than 1.8 m.

6.7. Safety Nets

6.7.1. When workplaces are more than 7.5 meters above the ground or water surface or other surface, and ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts are not being used, safety nets must be hung with sufficient clearance to prevent contact with the surfaces or structures below.

6.7.2. Nets must extend 2.5 meters beyond the edge of the work surface where employees are exposed and must be installed as close under the work surface as practical but in no case more than 7.5 meters below such work surfaces.

6.8. Respiratory Protection

6.8.1. Where industrial processes create atmospheric Contaminant, which may be hazardous to the health of employees, the first consideration always should be the application of engineering measures to control release of the contaminants.

6.8.2. In some cases, engineering control measures are not practical and the worker should therefore be supplied with personal respiratory protective equipment.

6.8.3. Ventilators, fans, air moves, dust mask or a combination of these should be used in dusty atmospheres. Users of dust masks, breathing air masks and respirators must be fit- tested and trained in their use.



7. SIGNS, SIGNALS AND BARRICADES

7.1. Accident Prevention Signs, Tags and Markings.

7.1.1. When hazardous work is to be performed the appropriate signs and symbols must be posted prior to starting work and must be removed or covered promptly when the hazards no longer exist.

7.1.2. Danger signs must be used only where an immediate hazard exists.

7.1.3. Caution signs must be used only to warn against potential hazards or to caution against unsafe practices.

7.1.4. Accident prevention signs, tags and markings are used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc., until the defective equipment can be repaired or removed.

7.2. Warning Barricades

7.2.1. Warning barricades will be erected before work begins or as soon as specific hazard is identified (in some situations a rigid guardrail will be needed).

7.2.2. Warning barricades must be erected and maintained at least two (2) meters from the edge of an excavation or opening.



8. FIRE PROTECTION

- 8.1. All employees must know where fire extinguishers are and how to use them.
- 8.2. Flammables shall be stored in properly labeled containers.
- 8.3. Accumulation of trash, oily rags, combustible materials and similar fire hazards of any nature will not be permitted.
- 8.4. All welding and cutting torches must be equipped with flame valve and standard operational gauges.
- 8.5. All alleyways, driveways, roads, stairway, ladder and transformers shall be kept clear of hazardous material and equipment.
- 8.6. Refueling of petrol and diesel equipment shall be done only in prescribed areas and with approved equipment. Employees shall take all measures to minimize spills and to clean up immediately and spills which may accidentally occur. Refueling equipment with the engine running is prohibited.
- 8.7. The Construction Subcon shall be install and maintain fire extinguisher and firefighting equipment to be available all times at the construction site and site office.
 - 8.7.1. There must be a fire extinguisher, water hose or other fire control equipment easily accessible for each welding, cutting, burning or other such operation.
 - 8.7.2. During any hot work operation, a pressurized fire hose and 2-piece of 10lb dry chemical power fire extinguisher must be provided at place of hot work. All Contractor's personnel shall be properly trained and know how to use such extinguishers and fire hose.



9. FIRST AID

- 9.1. Construction Subcon shall provide First Aid facilities for his employees on the site.
- 9.2. In the event of accident, all possible efforts to keep on lookers from the scene must be made. The only employees required in such areas are those directly engaged in assisting in the emergency.
- 9.3. Shock
- 9.3.1. Any person who has suffered a severe injury or even someone who has narrowly escaped injury is likely to be suffering from shock.
- 9.3.2. It is essential that persons administering first aid be aware of the symptoms of shock and take action to treat these symptoms in addition to the other injuries sustained.
- 9.4. Artificial Respiration
- 9.4.1. Electric shock, gassing, drowning, or suffocation may cause breathing to stop.
- 9.4.2. Artificial respiration must be started immediately and continued until the patient recovers or until professional medical aid takes over. If you are alone, do not leave the patient to seek help until his normal breathing has resumed.
- 9.5. Chemicals

Actions to be taken in the event of worker accidentally come into physical contact with dangerous chemicals are as follows:

- If splashed by chemical, goggles should be left in place until chemicals have been washed off.
- Unless chemicals have entered the eyes under the goggles, eye protection should be removed only after the chemicals have been washed from the surrounding area.
- The eyes should be washed with clean water for at least 15 minutes. Chemicals on the skin should be washed off with water using a safety shower where available.
- When it is necessary to remove clothing, it should be removed while under shower or water spray medical attention is essential in their cases.



9.6. Head Injuries

- Action in cases of head injury is to get the patient under medical care without delay.
- No head injury should be regarded lightly. Every patient who has had even a mild injury to the head is liable to develop complications, which can be serious. Treatment shall be as follows:
 - Loosen all tight clothing around neck, chest, and waist.
 - Check to see if the patient is breathing and initiate artificial respiration, if required.
 - Ensure that his throat and air passages are clear of secretions, foreign bodies and false teeth.
 - Check for other injuries
 - Arrange for the patient to be carefully transported to a hospital.

9.7. Bleeding

9.7.1. Every effort should be made to stop bleeding by direct pressure such as by applying a sterilized pad or dressing.

9.7.2. The wound should be firmly bandaged. Applying mild pressure on the artery between the wound and the heart may control arterial bleeding.

9.8. Fractures

9.8.1. Where a fracture is suspected, the limb must be immobilized. If possible, the injured part should be evaluated to reduce discomfort and swelling.

9.8.2. Fracture of the spine or pelvis must be treated with great care.

9.8.3. The casualty must not be moved, but should be covered with a blanket and made comfortable. Competent ambulance employee should only remove him.

9.9. Minor wounds

9.9.1. All minor wounds, cuts, and scratches should be attended to immediately, as delay increases the risk of infection.

9.9.2. The wound should be cleaned and then covered with a sterilized dressing or adhesive plaster. If the injury becomes painful, or is inflamed, medical attention should be obtained.



10. TOOLS – HAND AND POWER

10.1.General

- 10.1.1. Any tools or equipment deemed unsafe shall be marked promptly and or repaired or replaced.
- 10.1.2. Each worker must satisfy himself that all tools and equipment to be used by him are in first class condition and appropriate for the job that they are to be used on. Any defect and/or in proper functioning should be repaired to next user and or supervisors.
- 10.1.3. Any tools hand and power shall not be used for pry bars.
- 10.1.4. Tools shall be used only for the purpose for which they are designed.
- 10.1.5. Proper guards or shields must be installed on all power tools.
- 10.1.6. All portable power operated tools are of a certified or approved design and are safe to use.

10.2.Pneumatic Tools

- 10.2.1. Compressed air should not be used to clean the working space. Tools must not be modified or the labels and inscriptions defaced removed.
- 10.2.2. Competent persons must carry out maintenance of pneumatically operated equipment at regular intervals.

10.3.Guarding

- 10.3.1. When power operated tools are designed to accommodate guard, they shall be equipped with such guard when in use.
- 10.3.2. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment must be guarded if such are exposed to contact by employees.
- 10.3.3. Each worker must satisfy himself that all tools and equipment to be used by him are in good condition and appropriate for the job that they are to be used on.

- 10.4.If by using hand and power tools, employees are exposed to the hazard of flying, falling abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases,, they must be provided with and shall wear the appropriate personal protective equipment necessary to protect them from the hazard.



11. CRANES AND LIFTING EQUIPMENT

11.1. General

- 11.1.1. The manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks shall be complied with.
- 11.1.2. Rated load capacities, recommended operating speeds, special hazard warnings, or instruction must be visible to the operative while he is at his control station.
- 11.1.3. Rigging equipment must be inspected by a competent person and/or operator prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment must be tagged out of service and removed from the work area.
- 11.1.4. A competent person shall make a through, monthly inspection of the hoisting machinery. The operator shall maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment.
- 11.1.5. Standard operating signals should be agreed upon and should be used to direct all operations.
- 11.1.6. No modifications or additions, which affect the capacity of safe operation of the equipment, shall be made without the manufacturer's written approval.
- 11.1.7. Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, must be barricaded to prevent any worker from being struck or crushed by the crane.
- 11.1.8. Overhead and gantry cranes shall be plainly marked on each side of the crane as to its rated load capacity.
- 11.1.9. Ensure that personnel do not ride on the hook or on a load.
- 11.1.10. Ensure that personnel do not stand, walk or crawl beneath a slung load.
- 11.1.11. Ensure that the hoist rope is vertical to prevent swinging.
- 11.1.12. Avoid twisting or kinking wore rope.
- 11.1.13. Never use nuts and bolts to join a broken chain.
- 11.1.14. Never drop any item of lifting gear from a height.
- 11.1.15. Do not put any strain on ropes which are kinked.



11.2 Operator

11.2.1 The operator must be in possession of a current Government Crane Operator's License. In addition, he must be fully familiar with and competent to operate the particular type of crane to which he is assigned.

11.2.2 An operator may be certified to operate more than one type of crane, but under no circumstances is an operator permitted to operate a crane for which he has not been certified.

11.2.3 A supervisor must ensure that his operator is physically fit and mentally alert. If the operator shows any signs of illness, he must be removed from the crane.

11.3.1 Slinger/Rigger The slinger/rigger is responsible for properly attaching the load to the crane and giving the correct hand signals to the crane operator.

11.3.2 He must be properly trained in slinging/rigging, the standard lifting hand signals, and the general capabilities of the crane with which he is working.



12. EXCAVATION AND TRENCHING

- 12.1. Excavations such as ditches, trenches or holes shall be sloped sufficiently to prevent cave-in or slide. If sloping is impractical, shoring shall be used whenever the vertical dimension exceeds 1.5 meters.
- 12.2. Worker removing shoring after completion of work shall not be in the bottom of the excavation. Shoring shall be removed in a manner to prevent cave-in on worker.
- 12.3. Barricades, handrails, signals or other appropriate warning devices to protect worker from any hazardous operation or excavation shall be provided. Open trenches, excavations, etc., shall be covered when handrails or barricades do not provide adequate protection.
- 12.4. Grade lines, ropes, chains, and other tripping hazards shall be sufficiently marked to be clearly visible in the day or night.
- 12.5. Excavation by powered equipment is prohibited closer than 1.2 meters to any underground cable. Tiles covering electric cables shall not be removed without prior approval.
- 12.6. Located underground obstacles, cables and piping shall be marked, i.e. physically identified, in the field and will be updated on drawings of underground.
- 12.7. Ground water shall be removed from and kept out of, the bottoms of all trenches and excavations.



13. CONCRETE FORMS AND SHORING

- 13.1. Form work and shoring shall be designed, erected, supported, braced and maintained so that it will safely support all vertical and lateral loads that may be imposed upon it during placement of concrete.
- 13.2. Stripped forms and shoring shall be removed and stockpiled promptly after stripping, in all areas which persons are required to work or pass.
- 13.3. Protruding nails, wire ties, and other form accessories not necessary to subsequent work shall be pulled, cut or other means taken to eliminate the hazard.
- 13.4. Imposition of any construction loads in the partially completed structure shall not be permitted unless such loading has been considered in the design and approved by the engineer.



14. FLOOR AND WALL OPENING, AND STAIRWAYS

14.1. Floor and Wall Openings

14.1.1. All floor, grating or roof openings within a building, or other structure during the course of construction, alterations, or repairing, shall be covered with planks so as to carry safely any load which may be required to be supported thereon, or shall be fenced in on all sides by a standard railing and toe board.

14.1.2. Wall openings, from which there is a drop of more than 1.2 meters, and the bottom of the opening is less than 90 cm above the working surface, must be guarded by standard guardrails. If the bottom of the wall opening is less than 10 cm above the working surface toe boards must be installed.

14.2. Guarding of Open-Sided Floor and Platforms

14.2.1. Standard guardrails and toe boards must guard every open-sided floor or platform 1.8 meters or more above adjacent floor or ground level.

14.2.2. Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units and similar hazards must be guarded with a standard railing and toe board.

14.3. Guardrails, Stair, Railings and Toe boards

14.3.1. A standard railing shall consist of top rail, intermediate rail, toeboard, and posts, and shall have a vertical height of approximately 1 meter from upper surface of top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be halfway between the top rail and the floor, platform, runway, or ramp. Minimum requirements for standard railing under various types of construction are as follows:

- For pipe railings, posts and top and intermediate railings shall be a least 1/2 inches nominal diameter with posts spaced not more than 2.4 meters on centers.
- For structural steel railings, posts and top and intermediate rails shall be 50 mm by 50mm by 10mm angles or other metal shapes of equivalent bending strength, with posts spaced not more than 2.4 meters on centers.

14.3.2. Stair railing

14.3.2.1. A stair railing shall be of construction similar to a standard railings, but the vertical height shall be not more than 85cm nor less than 75cm from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.

14.3.3. Stairs and Stairways

14.3.3.1. On all structures, two or more floors (6 meters or over) in height, stairways, ladders, or ramps, shall be provided for employees during construction period. Debris, slippery and other loose materials shall not be allowed on or under stairways. Stairs shall be installed at angles to the horizontal of between 30 and 50. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs. Stairways having one or both open sides shall have a stair railing along the open side or sides.



15. LADDERS AND SCAFFOLDING

15.1. Ladders

- 15.1.1. All ladders shall be made of the proper material and be in good condition.
- 15.1.2. The use of ladders with broken or missing rungs or steps, broken rails, or other defective construction is prohibited.
- 15.1.3. Metal ladders shall not be used when they can become part of an electrical circuit.
- 15.1.4. All straight ladders shall be tied off.
- 15.1.5. Ladders shall be placed so that they form an angle no greater than 30 degrees from vertical.
- 15.1.6. Ladders shall extend at least 1 meter above the level to be served.
- 15.1.7. Spikes, for use in soft ground.
- 15.1.8. Ensure that footwear is not greasy, muddy or slippery and has a good grip on the rung.
- 15.1.9. Face the ladder and hold on with both hands.

15.2. Step ladders

- 15.2.1. Always open fully, set level on all four feet, and lock spreaders in place. Do not use like a straight ladder.
- 15.2.2. Do not place tools or material on steps or platform.
- 15.2.3. Get specific approval before using two-man stepladders.
- 15.2.4. Must be tied off under certain conditions.

15.3. Scaffolding

- 15.3.1. Makeshift scaffold, such as boxes, crates, drums and poles are prohibited.
- 15.3.2. Metal tube scaffolding is preferred. Any other scaffold material requires prior approvals.
- 15.3.3. Scaffolding and related material shall be carefully inspected at regular intervals and particularly just before use.
- 15.3.4. Sufficient sills and underpinning shall be provided for all scaffolds erected on filled or otherwise soft ground.
- 15.3.5. Scaffolds shall be plumb and level at all times.
- 15.3.6. Running scaffold shall be anchored to wall approx. every 9 meters of length and 6 meters of height. Additional anchors may be required when using pulley arms.
- 15.3.7. All scaffolding must be equipped with handrails, midrails and toeboards regardless of height.
- 15.3.8. Scaffold shall not be used as material hoist towers, for mounting derricks or to support pipe or equipment.
- 15.3.9. Timber boards used in the construction of work platform(s) shall be of good quality and reasonably straight grained, free from injurious ring shakes, cracks, splits, cross grains, unsound knots and knots in Contractor ease the strength of the timber. Planking shall not be painted, as this will conceal defects.



- 15.3.10. Planks used for platforms shall be uniform thickness and lay close together. Planks shall be overlapped at the bearers by at least 0.6 meters, with the bearing in the center of the overlap. When overhang a bears more than one-tenth of the length of the span, the planks shall be securely fastened to the bearer at the opposite end to prevent tipping.
- 15.3.11. Daily inspections shall be performed to ensure that no overstressing of structural members of scaffold will take place.
- 15.3.12. Safety belts or harness and lifeline shall be used if other adequate protection against falls cannot be provided during erection or dismantling.
- 15.3.13. Scaffolds and associated equipment shall not be modified in any manner that affects the designed performance. Only heavy tube scaffolding acceptable to heavy construction is allowed.
- 15.3.14. Adjusting screws together with proper compensate for unevenness of ground.
- 15.3.15. Braces shall not be forced to fit. The scaffold shall be adjusted until the proper fit can be made easily.
- 15.3.16. Only ladders shall be used when climbing scaffold; the cross braces shall not be used.
- 15.4. Rolling and Tower Scaffolds
 - 15.4.1. Tower of a height greater than three times the minimum base dimension shall be used.
 - 15.4.2. Caster brakes shall be locked when not in motion.
 - 15.4.3. Tower shall be free of men, material and equipment before being moved.
 - 15.4.4. Surface over which a tower scaffold is being moved shall be cleaned of rubber or any material that could cause the tower to tip over.
 - 15.4.5. Fixed towers shall be guyed or tied-off every 6 meters of elevation.
- 15.5. Suspended Scaffolding
 - 15.5.1. 10mm (minimum) steel wire rope shall be used to support or suspend scaffolds. All suspended scaffolds shall be anchored to prevent swinging.
 - 15.5.2. The suspended support shall be electrically insulated when are welding is to be performed to guard against arcing and subsequent failure.
 - 15.5.3. Worker on suspended scaffolds work platforms must use independent safely lines and safety harness with lifeline and lanyards.



16. STEEL ERECTION

16.1. Personal Protection

16.1.1. In all structures, all employees exposed to hazard more than 3m high shall wear safety belt or harnesses. Lifelines shall be installed as needed due to facilities tying-off. When the use of safety belt is not appropriate due to the hazard of being pinched or struck by incoming steel, connectors will be only permitted to unhook their safety harness during the actual receiving and positioning of structural members. As soon as it is safe and appropriate to do so (generally as soon as the connection bolts have been installed), the connector will be required to reconnect his safety belt.

16.1.2. Safety nets are only an acceptable substitute for safety belt when the use of safety belts is impractical. When safety nets are used, they will generally be used on the interior of the structure only. Lifeline will be installed along the perimeter and within the structure whenever employees are exposed will be tie-off whenever they are so exposed.

16.1.3. For the protection of other crafts, signs and barricades will be installed at the area where the erection of steel is in progress.

16.1.4. It should be emphasized that this mandatory and must be followed at all times. Any person who is found violating this procedure will be subject to removal from the site.

16.2. Rigging

16.2.1. A competent worker prior to initial use on the project shall inspect rigging equipment and monthly thereafter to ensure that it is safe.

16.2.2. Damaged rigging equipment shall be removed from service immediately.

16.2.3. Riggers must be qualified to rig and signal.



17. WELDING AND BURNING

- 17.1. Welding or cutting torches and hoses shall not be connected to cylinders when stored in any enclosure or building. When work is shut down and hoses disconnected all valves at the gas and oxygen cylinders must be closed.
- 17.2. Gas and oxygen cylinders shall be handled with care, properly supported in an upright position away from any source of heat or flames and securely tied-off. All cylinders not in use shall have the protective valve cap in place, shall be vertically secured, and be stored outside the work area.
- 17.3. Oxygen cylinders in storage and not in use shall be separated from gas cylinders by a fire retardant partition or a minimum distance of 6 meters.
- 17.4. When hoisting equipment, a basket lifts gas and oxygen cylinders, cradle or similar handling device shall be closed.
- 17.5. When oxygen or gas cylinders are transported, protective valve caps shall be in place and valves shall be used.
- 17.6. Special care (use of welding blankets) shall be taken during overhead cutting and welding operations to safeguard the work and prevent falling sparks from starting a fire or causing damage. Warning signs shall be posted around and at each level below the area of overhead welding or burning operation. Fire extinguishers will be ready and available, or the plant approved fire houses must be attached to firewater hydrants ready for use.
- 17.7. Gas and oxygen cylinders shall be used when secured on a cylinder carrier. Loose cylinders shall never be used.
- 17.8. Oxygen cylinders and equipment shall be kept free from oil or grease.
- 17.9. Gas and oxygen cylinders shall not be taken into confined spaces.
- 17.10. Welding cables and oxygen gas hoses shall be inspected regularly. The hoses shall be fitted by means of tight hose clamps.
- 17.11. The ground cable shall be attached as close as possible to the work piece by means of a clamp. The ground cable shall not be attached to an existing installation or apparatus. Welding of the ground cable is forbidden.
- 17.12. Welder and his helpers must use adequate eye and face protection while welding. Welding shields (curtains) must be used to protect the eyes of nearby workers from flash burn exposure.
- 17.13. Oxygen and gas cylinders must be transferred to a designated location away from operating units and tank farms after working hours.
- 17.14. When not in use, diesel welding machines, generators, and transformers must be turned off. When in use they must be protected by suitable covers for general protection. Refueling shall be done with machines turned off.



- 17.15. When employees are working with welding and cutting equipment, adequate ventilation has to be furnished.
- 17.16. All combustible material in the vicinity the welding or cutting operation must be removed, or of this is not possible, covered by fire resistant materials.
- 17.17. All welding cables and oxygen hoses shall hanged 1m high steel column wall not to disturb on passage or access.
- 17.18. The work area must be kept clean and wooden, all combustible material must be removed.
- 17.19. Welding machines shall be turned off at the end of your shift.
- 17.20. Never do electric welding from a metal ladder.
- 17.21. Gas and oxygen cylinders shall be provided with turn-off wrench during use.
- 17.22. Must be check regulator well fitted to cylinder.
- 17.23. Do not use matches or cigarettes to light a torch.
- 17.24. Do not use compressed gas to clean your clothing, blow out cinch anchor holes or otherwise clean your working area.
- 17.25. Gas cylinders shall be handled with care and shall not be dropped.
- 17.26. Gas cylinder shall not be misused similar purpose as rollers, support or for any other similar purpose.



18. ELECTRICAL WORK

- 18.1. Qualified and experienced workers shall perform all electrical works, equipment shall be locked or secured to prevent starting by unauthorized person.
- 18.2. Warning signs or posters, such as DANGER, NO ENTRY, DON'T TOUCH, etc., shall be posted at dangerous places, such as substations, switch boxes, and overhead or underground cable.
- 18.3. Electrical parts to be used shall be in good condition, including cords for connection. The extension and outlets to connect tools have to be polarized.
- 18.4. Transformer Banks or high voltage equipment shall be barricaded with a fence. The entrance shall be locked.
- 18.5. Circuit Breakers shall be provided for all electrical equipment, to prevent worker from being injured by electrical shock.
- 18.6. Temporary switch boxes shall be installed in the space provided with a waterproof roof and door which can be locked. Switch boxes shall be grounded with vinyl-insulated copper wire.
- 18.7. Before welding machines are used, insulation shall be tested and certified to be in safe operating conditions. Automatic antistatic discharge devices shall be provided for all welding machines. All exposed terminals shall be covered safely with insulation tape.
- 18.8. To prevent a short circuit or electric discharge, special precautions, such as grounding, shall be taken for wiring work where metal scaffolds or steel structures are erected. Grounding shall be secured by connecting the wire to on earth and buried firmly in the ground.



19. VESSEL AND CONFINED SPACE ENVIRONMENT (V/CS)

- 19.1. A breathable atmosphere can be maintained by either natural draft or forced ventilation. Compressed air must be blown into a V/CS. Air supplied respiratory equipment is required when entering a V/CS when there is any oxygen deficiency (less than 19.5%).
- 19.2. The atmosphere in the V/CS shall be tested to entry and special care must be taken to ensure that all accessible areas of the V/CS are sampled. Periodic tests should also be done during the work.
- 19.3. Welding and Burning
- 19.3.1. The possibility of flammable, explosive, or toxic materials being absorbed in the shell material must be considered prior to burning or welding.
- 19.3.2. All surfaces covered with toxic preservatives shall be stripped of all toxic coating for a distance of at least 2 feet from the area of heat application or employees shall be protected by air supplied respirators and, if applicable, protective clothing.
- 19.3.3. Burning shall be done only with the cylinders located outside the V/CS and hose connections shall be checked for leakage prior to tank entry. Remove all hoses from the V/CS at the end of the work, during lunch periods, etc. welding shall be done only with welding machines left outside the V/CS.



20. ABRASIVE BLASTING

- 20.1. Abrasives are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. Therefore, the concentration of respirable dust in the breathing zone of the abrasive blasting operator or any other workers must be kept below toxic levels. Adequate personal safety equipment should be provided for workers.
- 20.2. Aisles and walkways must be kept clear of steel shot or similar abrasives which may create a slipping hazard. Dust from abrasive operation shall not be permitted to accumulate on floors and shall be cleaned up promptly.
- 20.3. Sand or shot blasting areas, when possible, are to be prepared to minimize dust hazards to other workers. If this is not possible, all trades working in the area to be blasted should be removed from the area before blasting operations are started.
- 20.4. Operators shall be equipped with heavy canvas or leather gloves and aprons or equivalent protection to protect them from the impact of abrasives. Safety shoes shall be worn to protect against foot injury when heavy pieces of work are handled.
- 20.5. Equipment for protection of the eyes and face shall be supplied to the operator when the respirator design neither does nor provide such protection and to any other workers working in the vicinity of the abrasive blasting operations.



21. PRESSURE TESTING

21.1. General the purpose of pressure testing is to establish the strength, tightness, and suitability of a line or vessel. It is essential that safe practices are observed during testing since this can be a hazardous procedure. Stresses are high in the item being tested; there is the danger of air pockets with the subsequent risk of explosion; and where flammable fluids are used for testing, there is the ever present danger of fire should a rupture occur.

21.2. Preparation

21.2.1. The person in charge of testing should have read test procedure and instruction prepared in site office. All persons who will work on the test must be informed of the hazards and the necessary precautions.

21.3. General Requirements

21.3.1. No one should be allowed near equipment under test when the pressure is near the yield strength or when test pressures of over 35 Kg/cm² are being applied. The pressure should be lowered by 10% before inspecting for leaks.

21.3.2. The rate of pressure increase must not exceed 7 Kg/cm² per minute.

21.3.3. Smoking and other sources of ignition should not be permitted in the immediate area when testing with a flammable liquid.

21.3.4. When draining test fluid, the vessel should be vented slowly to avoid excessive vacuum.

21.3.5. Oxygen lines must be flushed of all traces hydrocarbons before introducing oxygen.



22. CHEMICAL

22.1. Handling of Chemicals

- 22.1.1. Before handling any chemical it is essential to know it's properties and follow the proper precaution and procedure.
- 22.1.2. All chemical shall be stored in appropriate containers with proper labels.
- 22.1.3. Hazardous chemical must be effectively isolated to avoid contamination. Incompatible materials must not be stored in the same area.
- 22.1.4. All employees must be aware that many of these chemicals are potential fire, explosion hazards and/or health hazards.
- 22.1.5. If you need assistance in establishing the hazard potential of a chemical, always consult supervisor.

