
	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>


## CONTENTS

SR. NO.	TITLE	PAGE NO.
1.	GENERAL INFORMATION	2
2.	ROLE OF IPR REPRESENTATIVES	3
2.1	IPR Contract Work In-charge	3
2.2	IPR Safety Officer	3
3.	ROLE OF THE CONTRACTOR	4
3.1	Top Management of the Contractor	4
3.2	Contractor Safety Officer, Safety Supervisor and/or Job Supervisor	5
3.3	Contractor Employees	5
4.	PENALTY FOR NON-COMPLIANCE	6
5.	PROVISION FOR SAFETY SUPERVISOR/SAFETY OFFICER OF CONTRACTOR	7
6.	GENERAL SAFETY PROVISIONS	8
6.1	Personal Protective Equipment	8
6.2	Electricity	9
6.3	House Keeping	11
6.4	Fire Safety	11
6.5	Scaffolding	12
6.6	Lifting/Hoisting Equipment & Erection	14
6.7	Welding and Gas Cutting	14
6.8	Grinding	15
6.9	Electrical Equipment – Installation and/or Maintenance	16
7.	REPORTING FORMS	17
7.1	Near Miss Reporting Form	17
7.2	Incident Reporting Form	18

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## **1. GENERAL INFORMATION**

- 1.1** The purpose of safety instruction document is to establish, implement and execute a practical and effective method for preventing accidents, injuries and property damage.
- 1.2** This document will help contractors and their associates to recognize, evaluate and control hazardous activities within their areas of responsibility.
- 1.3** This document defines the procedure with which safety practice will be administered, identifies responsibilities and ensures control of work area safety.
- 1.4** Contract agreement signed with contractors and the provisions of this document are intended to complement each other to ensure safe working conditions.
- 1.5** The provisions of this document apply to IPR and associated centres/units/departments.
- 1.6** Throughout this document, reference to a contractor means the contractor's company and the associated subcontractors, consultants, vendors and suppliers. Reference to contractor's management means personnel responsible for managing, supervising or directing contract activities and employees.
- 1.7** Non-compliance of this document is treated as non-compliance of contract agreement that may result in warning/penalty. Willful or repeated non-compliance may result in contractor dismissal and contract termination.
- 1.8** This document for contractors is a supplementary document to statutory rules, codes and regulations having jurisdiction, and does not negate, abrogate or minimise any provisions of these rules, codes and regulations. It is intended to supplement and enforce the individual program of the contractor and to coordinate the overall safety effort. Contractors are responsible for the safety and health of their employees, subcontractors, consultants, vendors, suppliers, and visitors while in IPR and associated centres/units/departments.
- 1.9** Contractor's managers and supervisors are responsible for preventing incidents or conditions that could lead to incidents, injuries, illness or fatalities. The ultimate success of the safety program depends on the cooperation of everyone. The contractor's management must ensure that safety provisions are enforced and that effective training and education programs are employed.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## **2. ROLE OF IPR REPRESENTATIVES**

### **2.1 IPR Contract Work In-charge**


The duties and responsibilities of Work In-charge shall include:

- 2.1.1 To ensure that specified requirements including safety, health, environment and security are complied.
- 2.1.2 To ensure that contractor workforce deployed is adequately qualified, trained and healthy to commensurate with the requirements of the job.
- 2.1.3 To ensure that the tools/tackles and machinery being used are properly tested, calibrated, designated and are in sound working conditions.
- 2.1.4 To take the required necessary corrective action immediately upon noticing or reported on noncompliance or any such condition which may poses a threat to safety, health or environment. In the event of repeated non-compliance, suitable action may be initiated as per the contract.
- 2.1.5 To ensure that the incidents are reported to all concerned within stipulated time frame.
- 2.1.6 To ensure availability of all the documents related to safety needed for the execution of the contract.
- 2.1.7 To ensure safe dismantling of all temporary facilities including structures, machineries, connections, etc. put up by the contractor, after completion of work.
- 2.1.8 To compile a report on the safety performance which is to be considered in future when selecting contractors.
- 2.1.9 To coordinate with IPR Safety Officer.

### **2.2 IPR Safety Officer**

The duties and responsibilities of the Safety Officer shall include:

- 2.2.1 To assess the hazards associated with jobs in consultation with all concerned and established safe working procedures.
- 2.2.2 To undertake routine/surprise inspections of all work sites, record deviation and reporting to authorities for corrective actions.
- 2.2.3 To investigate the incidents in order to advise corrective and/or preventive action.
- 2.2.4 To impose restrictions such as temporary closure of work site or electrical disconnection of equipment in case of non-compliance. Intimating the same to the contractor.
- 2.2.5 To identify areas of operations where specialised training is required for dealing with potential dangers.


	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

### **3. ROLE OF THE CONTRACTOR**

#### **3.1 Top Management of the Contractor**

The commitment of top management of the contractor towards safety is very important. Top management needs to ensure the following:

- 3.1.1 To implement safe methods and practices, deploy appropriate machineries, tools & tackles, experienced supervision and skilled workforce, etc. required for execution.
- 3.1.2 To ensure that employees and workers deployed are physically and mentally fit. They should possess requisite skill, qualification, experience etc.
- 3.1.3 To deploy qualified and trained safety supervisor, safety officers and/or safety manager reporting to site In-charge for supervision, co-ordination and liaison for the implementation of safety.
- 3.1.4 To ensure that the employees and workers have appropriate health and safety training. The certification of such training should be produced for verification, on demand.
- 3.1.5 To obtain all necessary and applicable licences, permits, and insurance policy of his employees and workers before executing any work. A copy of the same must be submitted to the relevant authority at IPR.
- 3.1.6 To ensure that all incidents (minor/major injuries, fatality, fire, property damage etc.) including near misses shall be reported to the relevant authority at IPR immediately verbally as well as in written format of IPR. Also, keep record for the same.
- 3.1.7 The liability for any compensation on account of injury sustained by an employee of the contractor will be exclusively that of the contractor.
- 3.1.8 To provide personal protective equipments required for the safety and first-aid kits at worksite.
- 3.1.9 To maintain appropriate records of all employees and workers deployed to carry out the work at site.
- 3.1.10 Contractor shall not employ any labour below 18 years of age.
- 3.1.11 A photo gate pass duly approved by IPR administration shall be issued by the contractor to their personnel, employees, subcontractors, etc.
- 3.1.12 To co-operate with all the security arrangements of IPR.
- 3.1.13 Contractor may ask for clarifications required in safety related issues, whenever a need arises.
- 3.1.14 To follow and implement all the safety rules and regulations of the local bodies, state, national and international. Contractor shall also comply with all the statutory requirements and notifications, as applicable, in relation to employment of his employees issued time to time by the concerned authorities.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

### **3.2 Contractor Safety Officer, Safety Supervisor and/or Job Supervisor**


The duties and responsibilities of the contractor safety officer, safety supervisor and/or job supervisor shall include the following:

- 3.2.1 To assess the hazards associated with work at site in consultation with all concerned and establish safe working procedure.
- 3.2.2 To establish a written records of factors that can cause injuries, illness or other safety related problems.
- 3.2.3 To undertake routine/surprise inspections of all work sites to ensure compliance with safety standards, codes, rules, regulations and orders applicable to the work concerned.
- 3.2.4 To check whether the proposed working arrangements/procedures are safe and satisfactory, particularly at the interface between contractors planned work and IPR facilities.
- 3.2.5 To ensure that required guards and protective equipment are provided, used and properly maintained.
- 3.2.6 To ensure that the workers understand the working procedures for carrying out the work safety and the hazards that may be encountered.
- 3.2.7 To take immediate actions to correct any violation of safety rules observed or reported.
- 3.2.8 To ensure that appropriate warning signboards and tags are displayed.
- 3.2.9 To report each incident and/or injury in accordance with established procedures and assists during investigation.
- 3.2.10 To arrange tool box meeting daily and shall continue this process to make workmen safety conscious. To keep a constant liaison with the relevant authority at IPR on safety issues.

### **3.3 Contractor Employees**

The duties & responsibilities of the contractor employees should include the following:

- 3.3.1 The contractors' employees must be trained for safety standards, procedure to carry out high risk job (if involved), use of Personal Protective Equipments (PPEs) in general and specific for a particular job, emergency preparedness and fire extinguisher and medical first-aid.
- 3.3.2 To perform work safely as per the job requirements/instructions and wear appropriate PPEs.
- 3.3.3 To inform promptly to their management regarding all work related incidents resulting in personal injury, illness and/or property damage, etc.
- 3.3.4 To take all necessary and appropriate safety precautions to protect themselves, other personnel and the environment.


	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

#### 4. PENALTY FOR NON-COMPLIANCE

The following penalties shall be imposed on the contractor by the IPR and shall be deducted from his running/final bill.

Sr. No.	Non-Compliance/Violation of Safety Protocols/Rules/Norms	Penalty
1.	Non-use of PPE like Safety Helmet / Safety Shoes etc.	Rs. 100 per day/person
2.	Over speeding (> 30Km/Hr) / rash driving or improper parking	Rs. 100 per occasion
3.	Non-use ELCB/MCB, Use of non-standard socket, poor cable joint, laying wire/cables on floor, non-use of socket, electrical jobs by incompetent person	Rs. 200 per day/case
4.	Working at height without full body safety harness, using non-standard scaffolding and not arranging fall protection arrangement	Rs. 500 per day/case
5.	Handling of compressed gas cylinders without trolley and double gauge regulator, Improper keeping/storage of gas cylinder	Rs. 200 per day/case
6.	Use of domestic LPG for cutting purpose.	Rs. 200 per day/case
7.	No fencing/barricading of excavated/open areas.	Rs. 200 per day/case
8.	No provision of firefighting equipment during hot works. Use of firewater for purpose other than firefighting.	Rs. 200 per day/case
9.	No reporting of Nearmiss/First-aid/Injury/Property damage/Minor fire etc. incidents	Rs. 500 per case
10.	Poor Housekeeping	Rs. 200 per day/case
11.	No deployment of safety officer/safety supervisor responsible for safety at work site as mentioned in Chapter No. 5	Rs. 500 per day

Safety Officer or any other officer authorized by IPR will report safety violation to the concerned Engineer In-charge for imposing necessary penalty. Engineer-in-charge shall ensure that the penalty amount has been deducted from the running bill of contractor. Imposing any penalty for violation of safety norms does not absolve the contractors from their contractual obligation/responsibility. Contractor shall be fully responsible for any accident and/or injury to their employees or property due to violation of safety norms.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## **5. PROVISION FOR SAFETY SUPERVISOR /SAFETY OFFICER OF CONTRACTOR**


The contractor shall depute at least one Safety Supervisor / Safety Officer for critical activities as follows,

- i. Work at height (working beyond 2.5 mtr. above ground)
- ii. Materials and Material Handling which includes movement of heavy material by crane, movement of tractor trolley on slopes, Manual lifting of heavy material to height, erection of heavy machinery, equipment, etc.
- iii. Loading and unloading of equipment, structural materials, machinaries, etc., Fabrication and erection work
- iv. Working near high voltage lines, electrical installations, etc., charging of electrical system, transformers, switch yard, switch gears, etc.
- v. Work related to welding, gas cutting, grinding, etc.

In addition to above list, IPR may also recommend for some specific tasks, which are not covered, to depute Safety Officer/Safety Supervisor.

Safety supervisor shall be qualified of minimum Diploma in Engineering/ Graduate in Science with approved course in the field of safety and/or fire. He shall able to read and understand English and speak regional/national language. He shall have experience as safety supervisor for a period of minimum one year.

Safety Officer shall be qualified of minimum Bachelor in Engineering/ Post Graduate in Science with approved course in the field of Safety and/or Fire. Safety Officer shall have good communication and written skill to liaison with the client. He shall have good command in English and regional/national language. He shall have experience for a period of minimum three years of supervisory level.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>


## **6. GENERAL SAFETY PROVISIONS**

### **6.1 Personal Protective Equipment**

The contractor is responsible to provide all necessary standard make (ISI marked) personal protective equipment (PPE) suitable to give sufficient protection against hazards involved in their work / job to their employees, as per the job requirement and insist/enforce their staff to put on the same while at works and ensure that the PPEs are properly used and maintained in a condition suitable for immediate use. The contractor shall have sufficient stock of various PPEs to avoid any shortage of supply and shall take adequate steps to ensure proper use of equipment by those concerned. The ongoing work is liable to be stopped at any time if the contractor's staff is found working without PPEs.

- 6.1.1 All persons employed at site shall use safety helmets. For other types of works, persons working in that area shall also use safety helmets, if advised by Safety Engineer/Engineer-In-Charge.
- 6.1.2 Persons engaged in welding and gas-cutting works shall use suitable welding face shields. The persons who assist the welders shall use suitable goggles. Protective goggles shall be worn while chipping and grinding.
- 6.1.3 All persons working at heights more than 2.5 m above ground or floor and exposed to risk of falling down shall use full body safety harness, unless otherwise protected by cages, guard railings, etc. In places where the use of safety harness is impractical, suitable net of adequate strength fastened to substantial supports shall be employed.
- 6.1.4 When workers are employed in sewers and inside manholes, which are in use, the Contractor shall ensure that the manholes are opened and are adequately ventilated at least for an hour. After it has been well ventilated, the atmosphere inside the space shall be checked for the presence of any toxic gas or oxygen deficiency and recorded in the register before the workers are allowed to get into the manholes. The manholes opened shall be cordoned off with suitable railing and provided with warning signals or caution boards to prevent accidents. There shall be proper illumination in the night.
- 6.1.5 The following is the list of various PPEs to be used for various works/worksites,




	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS</b> <b>FOR CONTRACTORS OF ELECTRICAL/MAJOR</b> <b>INSTALLATION OF ELECTRICAL EQUIPMENTS/</b> <b>MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date:</b> <b>20.03.2014</b>

### List of Safety Equipments


Sr. No.	PPE	Purpose
01	Industrial Safety Helmet	For protection of head against falling objects or during fall of person from height.
02	Safety Goggles (Grinding, Welding, etc).	For protection of eyes against flying particles / dust, chemical splash, spark, arc, flashover etc.
03	Face shield	For protection of face against flying particles / dust, chemical splash, spark, arc, flashover etc.
04	Ear plug / Ear muffs	For ear / hearing system protection while working in high noise level area.
05	Apron (PVC /cryo/Cotton)	For body protection against chemicals, oils, cryogenics, sharp edged objects, heat, hot objects etc.
06	Gloves (Nitrile/Leather, cryo, Electrical shock proof)	For protection of hands against chemicals, oils, cryogenics, sharp edged objects, heat, hot metals/objects, electricity etc.
07	Safety Shoes	For protection of leg/feet against falling objects, sharp edged objects, heat, hot metals/objects,, electricity etc.
08	Full body safety harness/ Rope /Life line/ Fall prevention system etc.	For fall prevention while working at heights or in depth, working in vessel or in confined space.
09	Dust Respirator	Protection of respiratory system against dust.
10	Self-contained breathing apparatus (SCBA) set	Working in oxygen deficient areas.

## 6.2 Electricity

The following are provided for general guidance of the Contractor and shall be read as specific requirement, in addition to complying with Indian Electricity Act, Indian Electricity Rules and IS Specifications.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

- 6.2.1 Only qualified electricians familiar with code requirements are allowed to perform electrical work.
- 6.2.2 Employees are not permitted to work near an unprotected electrical power circuit unless they are protected against electrical shock by de-energizing the circuit and grounding it, or are protected by effective insulation or other means, and are wearing .required personal protective equipment.
- 6.2.3 The electric power supply will be generally made available at one point in the works site of the contractor by the IPR.
- 6.2.4 All three phase equipment shall be provided with double earthing. All light fixtures and portable equipment shall be effectively earthed to main earthing.
- 6.2.5 All earth terminals shall be visible. No gas pipes and water pipes shall be used for earth connection. Neutral conductor shall not be treated as earth wire.
- 6.2.6 The contractor shall not connect any additional load without prior permission of IPR.
- 6.2.7 Joints in earthing conductors shall be avoided. Loop earthing of equipment shall not be allowed. However tappings from an earth bus may be done.
- 6.2.8 Electrical equipment and installations shall be installed and maintained as to prevent danger from contact with live conductors and to prevent fires originating from electrical causes like short circuits, overheating etc. Installation shall not cause any hindrance to movement of men and materials.
- 6.2.9 Materials for all electrical equipment shall be selected with regard to working voltage, load and working environment. Such equipment shall conform to the relevant standards.
- 6.2.10 Electric fuses and/or circuit breakers installed in equipment circuits for short circuit protection shall be of proper rating. It is also recommended that high rupturing capacity (HRC) fuses be used in all circuits. For load of 5 KW or more earth leakage circuit breaker of proper rating shall be provided in the circuits.
- 6.2.11 Wires and cables shall be properly supported and approved method of fixing shall be adopted. Cables shall not be left on floor/ground. Loose hanging of wires & cables shall be avoided. Lightning and power circuits shall be kept distinct and separate.
- 6.2.12 Reinforcement rods or any metallic part of structure shall not be used for supporting wires and cables, fixtures, equipment, earthing etc.
- 6.2.13 All cables and wires shall be adequately protected mechanically against damages. In case, the cable required to be laid underground, it shall be adequately protected by covering the same with bricks, Plain Cement Concrete (PCC), tile or any other approved means.
- 6.2.14 All armoured cables shall be properly terminated by using suitable cable glands. Multi-stranded conductor cables shall be connected by using cable lugs/ sockets. Cable lugs shall preferably be crimped. They shall be of proper size and shall correspond to the current rating and size of the cable. Twisted connections will not be allowed.
- 6.2.15 All the Distribution Boards, Switch Fuse units, Bus bar chambers, ducts,

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

cubicles etc. shall have MS enclosures and shall be dust, vermin and waterproof. The Distribution Boards, switches etc. shall be so fixed that they shall be easily accessible.


- 6.2.16 The Contractor shall provide proper enclosures/covers of approved size and shape for protection of all switch boards, equipment etc. against rain.
- 6.2.17 Isolating switches shall be provided close to equipment for easy disconnection of electrical equipment or conductors from the source of supply, when repair or maintenance work has to be done.
- 6.2.18 All connections to lighting fixtures, starters or other power supplies shall be provided with PVC insulated, PVC sheathed twin/three/four core wires to have better mechanical protection for preventing possible damage to equipment or injury to personnel. Taped joints shall not be allowed and the connections may be made in looping system. Electric starter of motors, Switches shall not be mounted on wooden boards. Only sheet steel mounting or iron framework shall be used.
- 6.2.19 Only PVC insulated and PVC sheathed wires or armored PVC insulated and sheathed cables shall be used for external power supply connections of temporary nature. Weatherproof rubber wires shall not be used for any temporary power supply connections. Taped joints in the wires shall not be used.
- 6.2.20 All portable appliances shall be provided with three-core cable and three-pin plug. The third pin of the plug shall invariably be earthed. It shall be ensured that the metal part of the equipment shall be effectively earthed.

### **6.3 House Keeping**

- 6.3.1 The Contractor shall at all times keep his work spot, site office and surroundings clean and tidy from rubbish, scrap, surplus materials and unwanted tools and equipment so as not to create unsafe condition or fire hazard.
- 6.3.2 Welding and other electrical cables shall be properly routed.
- 6.3.3 No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.
- 6.3.4 Cleaning of the work area at the end of the day and upon completion of work is a part of the job.
- 6.3.5 The Engineer-in-charge has the right to stop work if the Contractor fails to improve upon the housekeeping after having been notified.

### **6.4 Fire Safety**

- 6.4.1 All necessary precautions shall be taken to prevent outbreak of fires at the site. Adequate provisions shall be made to extinguish fires, if it still breaks out.
- 6.4.2 Quantities of combustible materials like timber, bamboos, coal, paints, etc., shall be kept minimum in order to avoid unnecessary accumulation of combustibles at site.


	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

- 6.4.3 Containers of paints, thinners and allied materials shall be stored in a separate room which shall be well ventilated and free from excessive heat, sparks, flame or direct rays of the sun. The containers of paint shall be kept covered or properly fitted with lid and shall not be kept open except while using.
- 6.4.4 Fire extinguishers shall be located at the site at appropriate places.
- 6.4.5 Adequate number of workmen shall be given education and training in firefighting and extinguishing methods.


### **6.5 Scaffolding**

Accidents are also caused by the ladders falling or the climber losing his balance or failure of scaffolds. As such, utmost care should be taken as ladder and scaffolding are extensively used for maintenance and construction purpose. Some of the safe practices as listed below are to be observed before commencement of work.

- 6.5.1 Adequate and safe means of access and exit shall be provided for all work places, at all elevations. Using of scaffolding members (avoiding a ladder) for approach to high elevations shall not be permitted.
- 6.5.2 Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short duration work as can be done safely from ladders. Ladder shall be of rigid construction having sufficient strength for the intended loads and made either of good quality wood or metal and all ladders shall be maintained well for safe working condition.
- 6.5.3 Short ladder must not be tied together to give greater lengths. All ladders of 6 m or above should be tied to the structure on which they are resting to prevent from. An extra worker shall be engaged for holding the ladder if ladder is not securely fixed. If the ladder is used for carrying materials, suitable foot holds and handholds shall be provided on the ladder. The ladder shall be given an inclination not steeper than 1 in 4(1 horizontal and 4 vertical). Ladders shall not be used for climbing carrying materials in hands. While climbing both the hands shall not be free.
- 6.5.4 The free length must extend by 1.5 meters above the point of landing but should not be more than 1/4<sup>th</sup> of the ladder length. No portable single ladder shall be over 9 meter in length. Metal ladders may not be used for electrical work.
- 6.5.5 Scaffolding or staging more than 3.5 m above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a standard guard rail properly attached, bolted, braced or otherwise secured at least 1.0 m high above the floor or platform of such scaffolding or staging. The guard rail shall extend along the entire exposed length of the scaffolding with only such opening as may be necessary for the delivery of materials. Standard railing shall have posts not more than 2 m apart and an intermediate rail halfway between the floor or platform of the scaffolding and the top rail. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure. Scaffolding and ladder shall conform to relevant IS

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

- specification (IS: 3696). Timber/Bamboo scaffolding shall not be used.
- 6.5.6 Working platforms of scaffolds shall have toe boards at least 15 cm in height to prevent materials from falling down.
  - 6.5.7 Every part of scaffolding must be of sound construction. Steel planks used in scaffolds should be carefully inspected and should be tied on both sides with suitable fixing arrangements to the pipes. Scaffolding must not be overloaded.
  - 6.5.8 The Steel pipe & clamp to be used must be of good quality. The spacing between the vertical & horizontal members of the scaffolding should not be more than 1.5m and 1 meter respectively. The scaffolding should be further strengthened with cross bracing and stays.
  - 6.5.9 The scaffolds should be provided with short climbs ladders for safe ascending/descending of workmen in the job. Only those workmen who are well trained/experienced in erecting scaffolding should be engaged for scaffolding work. The men working in the actual erection/dismantling of the scaffolding and all persons using the scaffolding must use appropriate PPEs.
  - 6.5.10 A sketch of the scaffolding proposed to be used shall be prepared and approved by the Engineer-in charge, prior to start of erection of scaffolding. All scaffolds shall be examined by Engineer-In-Charge before use.
  - 6.5.11 Working platform, gangways and stairways shall be so constructed that they shall not sag unduly or unequally and if the height of the platform or gangway or stairway is more than 3.5 m above ground level or floor level, they shall be closely boarded, shall have adequate width for easy movement of persons and materials and shall be suitably guarded.
  - 6.5.12 The planks used for working platform shall not project beyond the end supports to a distance exceeding four times the thickness of the planks used. The planks shall be rigidly tied at both ends to prevent sliding and slippage. The thickness of the planks shall be adequate to take load of men and materials and shall not collapse.
  - 6.5.13 Each opening in the floor of a building or at a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing.
  - 6.5.14 Safe means of access shall be provided to all working platforms and other elevated working places. Every ladder shall be securely fixed. No single portable ladder shall be over 9 m in length. For ladders up to 3m in length the width between side rails in the ladder shall in no case be less than 300 mm. For longer ladders this width shall be increased by at least 20 mm for each additional meter of length. Step spacing shall be uniform and shall not exceed 300 mm.
  - 6.5.15 Adequate precautions shall be taken to prevent danger from electrical lines and equipment. No scaffolding, ladder, working platform, gangway runs, etc. shall exist within 3 meters of any uninsulated electric wire. Whenever electric power and lighting cables are required to run through (pass on) the scaffolding or electrical equipments are used, such scaffolding structures shall have minimum two earth connections with earth continuity conforming to IS Code of Practice.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>


## **6.6 Lifting/Hoisting Equipment and Erection**

Accidents do happen while working overhead or due to failure or unsafe use of hoisting equipment. As such, adequate care must be taken to prevent it. The following are some of the precautions to ensure safety of the workmen engaged by the contractor:

- 6.6.1 Contractors involved in handling of any material overhead must install necessary barricades, warning signs or take any other steps necessary to prevent others from walking/standing beneath the load.
- 6.6.2 Hoisting machines, tackles including their attachments, anchorage and supports must conform to the good mechanical construction, sound materials and adequate strength and free from patent defect and shall be preserved in good condition.
- 6.6.3 All equipments like crane, chain blocks, sling, rope including all other material handling equipments must have valid load test certificates.
- 6.6.4 Thorough inspection and load testing of lifting machines and tackles shall be done by a competent person at least once every 12 months and records of such inspection and testing shall be maintained.
- 6.6.5 Every crane driver or hoisting appliances operator shall be properly qualified and no person below the age 21 years should be in charge of any hoisting machine.
- 6.6.6 Every hoisting machine and all gears shall be plainly marked with the safe working load. No part of any machine or gear shall be loaded beyond the safe working load (SWL).
- 6.6.7 In case of IPR's machines, the safe working load shall be notified by Engineer-in-charge. For contractor's machines, the contractor shall notify the safe working load to Engineer-in-charge.
- 6.6.8 Motors, gearing transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with safe guards.
- 6.6.9 No cranes shall be left unattended with hanging load and on completion of work, the boom/jib of the crane may be brought down and kept in horizontal condition.
- 6.6.10 No crane including hydra crane shall be allowed to move on road with suspended load.

## **6.7 Welding and Gas Cutting**

- 6.7.1 Welding and gas cutting operations shall be done only by qualified and authorized persons and as per IS specifications and Code of Practice.
- 6.7.2 Welding and gas cutting shall not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of gaseous mixtures.
- 6.7.3 Welding and gas cutting equipment including hoses and cables shall be maintained in good condition.
- 6.7.4 Barriers shall be erected to protect other persons from harmful rays from the work. When welding or gas cutting is in elevated positions, precautions shall be taken to prevent


	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

sparks or hot metal falling on persons or flammable materials. Adequate ventilation shall be provided while welding in confined space.

- 6.7.5 Suitable type of protective clothing consisting of fire resistant gauntlet gloves, leggings, boots and aprons shall be provided to workers as protection from heat and hot metal splashes. Welding shields with filter glasses of appropriate shade shall be worn as face protection.
- 6.7.6 Welding and gas cutting shall not be done on drums, barrels, tanks or other containers unless they have been emptied, cleaned thoroughly and it is made certain that no flammable material is present.
- 6.7.7 Fire extinguisher shall be available near the location of welding operations. Prior permission shall be obtained from safety section for working at vulnerable areas and operating areas before flame cutting/welding is taken up.
- 6.7.8 Tarpaulin, if used should be of fire retardant.
- 6.7.9 For electric (Arc) welding the following additional safety precautions shall be taken:
- When electrical welding is undertaken near pipe lines carrying flammables, such pipe lines shall not be used as part of earth conductor but a separate earth conductor shall be connected to the machine directly from the job.
  - Personnel contact with the electrode or other live parts of electric welding equipment shall be avoided.
  - Extreme caution shall be exercised to prevent accidental contact of electrodes with ground.
- 6.7.10 The cylinders containing poisonous/toxic or inflammable / explosive gas like Oxygen, Acetylene, Hydrogen, Ammonia, Chlorine, CO<sub>2</sub> etc. shall be handled safely taking due cares. To handle / shift such cylinders a special trolley / cage meant for it must be used but in no case it should be rolled.
- 6.7.11 No domestic LPG cylinder is allowed for Hot Work such as Gas Welding / Gas Cutting.
- 6.7.12 A person must remain in the area for a minimum period of 30 minutes after hot work is completed to ensure the site is safe. Welding machine shall be switched off after the completion of work.

## **6.8 Grinding**


- 6.8.1 All portable grinders shall be used only with their wheel guards in position to reduce the danger from flying fragments should the wheel break during the use.
- 6.8.2 Grinding wheels of specified diameter only shall be used on a grinder- portable or pedestal - in order not to exceed the prescribed peripheral speed.
- 6.8.3 Goggles shall be used during grinding operation.

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## **6.9 Electrical Equipment – Installation and/or Maintenance**

- 6.9.1 Consider all the equipment as live before touching until they are proved to be dead.
- 6.9.2 Before attempting maintenance on electrical equipment, ensure electrical isolation & earthing. Follow “permit to work on electrical system” procedures.
- 6.9.3 Be sure about isolation by physical verification. Check isolation tags on feeders/breakers.
- 6.9.4 Keep electrical insulating mat/paint in front of electrical panel/ switches.
- 6.9.5 Inspect the equipment thoroughly before normalization.
- 6.9.6 Follow SIDE rule before starting maintenance work on electrical equipment. (S=Switch off, I=Isolate, D=Discharge, E=Earthing).
- 6.9.7 Have minimum number of cable joints and insulate properly all the cable joints.
- 6.9.8 If water cooling is used, ensure that water connections are fitted correctly with no chance of leakage onto HV system.
- 6.9.9 Supply of energy to every electrical installation, other than low voltage installation below 5 kW, shall be controlled by an earth leakage protective device so as to disconnect the supply instantly on the occurrence of earth fault or leakage current.
- 6.9.10 Don't work alone in and around high voltage system.
- 6.9.11 Lifting of electrical equipment as per manufacturer's instructions.
- 6.9.12 Do not allow visitors to enter into high voltage zones without escorting by an authorized person.
- 6.9.13 Never depend on verbal communication for isolation of electrical equipment.
- 6.9.14 Do not wear metallic ornament while working on electrical equipment.
- 6.9.15 Do not overload the power cable beyond its current carrying capacity.
- 6.9.16 Do not insert bare wires of appliances in the plug socket.
- 6.9.17 Only trained, experience and authorized personnel should carrying out maintenance, repair, adjustment etc.
- 6.9.18 Identified tools should be used to carry out such works.
- 6.9.19 Eli Chips and debris must be swept up and properly disposed.



	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## 7. REPORTING FORM

### 7.1 Near Miss Reporting Form

(This form may be filled and submitted to the Safety Section within 48 hours from the incident time)


1. Name of Person Affected/Observed Near miss:	2. Group/Division/Section:
3. Designation:	4. Location of Near Miss:
5. Date & Time of Near Miss:	6. Contact no:/Ext. No.:
7. Near Miss Description: <i>(Describe fully, the protocol / procedure been followed including all substances, equipment and machinery being used which was related to the near miss.)</i>	
<p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>	
8. Possible Damage that might have happened:	
(i)	
(ii)	
9. Corrective Actions Proposed to prevent reoccurrence of such near miss incident(s):	

**Submitted By:**

Signature:

Name:

Date:

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS FOR CONTRACTORS OF ELECTRICAL/MAJOR INSTALLATION OF ELECTRICAL EQUIPMENTS/ MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date: 20.03.2014</b>

## 7.2 Incident Reporting Form

*(This form is to be filled and submitted for all incidents except near miss to safety section within 72 hours from the incident time)*

### A. PERSONNEL INFORMATION


Name of Injured:		PR No.:
Group:		Contact No./ Ext. No.:
<b>Incident Site:</b>	<b>Employee Category:</b> <input type="checkbox"/> Permanent Employee <input type="checkbox"/> Project Employee <input type="checkbox"/> Contract <input type="checkbox"/> AMC <input type="checkbox"/> TPIA <input type="checkbox"/> Service Provider/Vendor <input type="checkbox"/> Other Category	

### B. CATEGORY OF INCIDENT

First aid case	
Medical case	
Asset/Equipment/Property damage	
Vehicle incident	
Fire	
Fatal Accident	

### C. INCIDENT INFORMATION

Date / Time of Incident	Date/Time Reported To Group Leader
Person Reporting Incident	
Incident Description:	
Injury / Illness Description:	

	<b>INSTITUTE FOR PLASMA RESEARCH</b>	<b>Revision: 00</b>
	<b>SAFETY INSTRUCTIONS</b> <b>FOR CONTRACTORS OF ELECTRICAL/MAJOR</b> <b>INSTALLATION OF ELECTRICAL EQUIPMENTS/</b> <b>MACHINARIES AND OTHER RELATED ACTIVITIES</b>	<b>Eff. Date:</b> <b>20.03.2014</b>

#### D. TREATMENT INFORMATION

Treatment Description		
Treatment Administered By	Date Of Treatment	Time Of Treatment
Phone No of clinic / hospital	Name of Clinic/Hospital:	
Pl. attach medical officer's prescription for medical treatment: -	Released from Hospital Date / Time: -	

#### E. INITIAL CORRECTIVE ACTION INFORMATION

Immediate Causes of incident:
Initial Corrective actions taken 1. 2. 3.

**Prepared By:**

Sign:  
Name:  
Designation:  
Date:

**Reviewed By:**

Sign:  
Name:  
Designation:  
Date: