

HSE Procedure Manual

HSE/PM



M/S.Megha Engineering & Infrastructures Ltd

Issue: A

Date: 01/02/2013

Address

M/s. Megha Engineering & Infrastructures Ltd.

S-2, Technocrat Indl Estate

Balanagar-Hyderabad

Ph: 040-44336700

Fax: 040-

e-mail: info@meilgroup.com

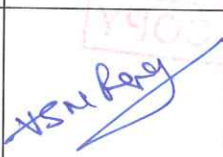
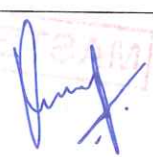

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Megha Engineering & Infrastructures Ltd

HSE PROCEDURE MANUAL

HEALTH SAFETY AND ENVIRONMENT POLICY & MANUAL

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| ORGANISATION SAFETY MANUAL | | SAFETY OFFICER | GENERAL MANAGER (HR & ADMN) | MANAGEMENT REPRESENTATIVE (MR) |
| DESCRIPTION | DATE | PREPARED BY | REVIEWED BY | APPROVED BY |
| | |  |  |  |



Megha Engineering & Infrastructures Ltd

Reg. Off. S-2, TIE, Balanagar, Hyderabad – 500 037


Telephone- No; 040.44336700—Fax.040 44336800

AUTHORITY AND RESPONSIBILITIES OF THE SAFETY ORGANISATION


The Company's HSE Policy

- The company's HSE policy depends above all on the quality of its personnel and workforce, who are all part of the system.
- The company is totally committed to a policy of prevention, reduction and elimination of events that could result in loss and damage to men and machinery. The company is further committed to provide a congenial environment and promotion of personal health of workforce and staff of the company.
- The company is further committed to protect the interest of the customer at all times.
- The company is committed to ensure that the HSE policy is implemented at all levels of the company by involvement of employees on methods, structures, attitudes and culture.
- The company's management directly conveys the message to all the company's staff, workers and subcontractors representatives who are responsible for safety, health and environment.
- The specific objectives of the company's HSE policies are;
 - ✓ Provision and maintenance of safe, healthy and productive working environment.
 - ✓ To place paramount emphasis on the prevention of accidents
 - ✓ The protection of life, equipment and property.



Mr. P. V. Krishna Reddy
Managing Director

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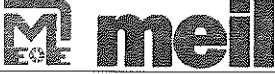
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| S.No | Designation | Copy Name | Copy No | Copy Type (Soft Copy / Hard Copy) |
|------|-------------------|-----------------|---------|-----------------------------------|
| 01 | Managing Director | Controlled Copy | ---- | Hard Copy |
| 02 | AVP- HRD | Controlled Copy | ---- | Soft Copy |
| 03 | AM Safety | Master Copy | 01 | Hard Copy |
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| Title | Health & Safety Awareness Promotion | Revision No | 00 |
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01.01 Objective:

The objective of safety promotion is to develop and maintain awareness among all personnel of the worksite commitments to safety and of the individual responsibility to support that commitment.

01.02 Procedure:

01.02.01 Posters and signs:

Posters and signs shall be adopted as visual aids for accident and free prevention.

Posters shall be written in English, Hindi and will be conspicuously displayed.

01.02.02 Booklets and Brochures:


To increase safety awareness and as part of personnel safety training safety handbooks or brochures will be issued.

01.02.03 Videos/Films:

MEIL Safety Department will conduct a Safety Talk (minimum weekly) to the workforce or screening of video on safety so as to promote the safety and health of workers in the site. The topic of the Safety Talk or screening of video will be decided by the MEIL Safety Department. MEIL will decide the category and type of workers, which require attending for the talk. Record of attendance will be kept by the safety department. Respective MEIL Department Head and Subcontractors Management shall ensure the attendance of these personnel.

Incentive Programs :-

MEIL will develop a procedure to recognize and acknowledge good safety performance by individual's teams or the subcontractors. The development of the Safety incentive program, which includes how it should run and types of awards, will be developed with the consensus of the MEIL Safety Committee. The Safety incentive program will be implemented within six months after the inauguration of the MEIL Safety Committee.

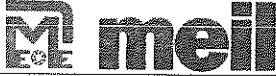
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Personal protective equipment (PPE) includes protective equipment for the eyes, face, head, and extremities. These protective equipments may be such items as protective clothing, respiratory devices, protective shields, and barriers. When this equipment is needed because of hazardous processes, environmental hazards, chemical hazards, radiological hazards, or mechanical irritants which may cause injury or impairment to any part of the worker's body, by either absorption, inhalation, or physical contact, personal protective equipment is to be provided, used, and maintained in a sanitary and reliable condition.

All personal protective equipment must be of safe design and construction for the work to be performed.

Common Guidelines for Wearing PPE:-

- Wear all required PPE for the job or task.
- Inspect all PPE for wear or damage prior to use.
- Take care of and clean PPE when necessary.
- Do not use PPE for which worker has not received training.
- Workers working in areas where overhead structures, equipment, or stored materials create a hazard shall wear hard hats and be required to wear them at all times.
- Workers wearing prescription eyeglasses should use hardened safety glass lenses.
- Goggles shall be worn during climbing, lifting, or potential contact with chemicals,
- Approved ear protection shall be worn when required.
- Respirators shall be worn if the concentration of dust, toxic fumes, or other air contaminants exceeds safe exposure levels.
- Safety full body harnesses shall be used when working surfaces are above 1.8m
- Earplugs or earmuffs should be provided to those working at place with high noise areal, above 90 dBa.
- Proper Safety shoes or boots, in good repair, shall be worn on the jobsites.
- Workers shall wear suitable work clothing consisting of at least long pants.
- Rubber boots must be worn when doing concrete work.
- Always wear life jackets when working over, or adjacent to deep water.
- Use only applicable ISI marked safety equipments.

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The existing Safety practice in various sites/plants have been reviewed and it is proposed to constitute individual committees at sites /plants level consisting of a chairmen, secretary and members in order to bring Safety awareness among employees and implementation of statutory & safety norms.

Role & responsibility of Safety Committee:

a) Chairperson:

To summon and preside over the meeting of Safety committee. He / She has absolute authority over the members for improve the safety the other members become the representatives.


- Develop the Safety committee meeting agendas.
- Coordinate and conduct orderly meetings
- Establish necessary deadlines to sub-committee assignments
- Provide appropriate and timely follow-up on problems and recommendations developed by the committee.
- Serve as a communication liaison between management and the committee.
- Promote health and safety by personal example.
- Must have the confidence of other committee members, employees and management.
- Health and safety management and applicable ILHR/OSHA standards.

Note: The chairperson may be appointed by management or (preferably) elected by majority vote of the membership.

b) Secretary:

- To organize the safety committee meeting and proper minutes.
- Present to the committee status of all inspection reports and incidents & investigation.
- To prepare individual safety reports he has to preside over the safety committee meeting.
- To maintain, record and disseminate minutes of each meeting.
- Actively promote health and safety by his/her personal example and communication with employees and supervisors.

Note: The Secretary should be appointed by the Chairperson or elected by members of the Committee for a one year term. Rotating this post periodically to give all members an opportunity for this post is also recommended.

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c) Members:


To assist the chairmen in the field safety management and provide constant surveillance on all matters attaining to safety.

- All the committee members must attend the committee meetings and discuss all the site / unit problems and must have submit the report in the meetings.
- Each committee member should be made up of individuals from various areas and levels of organization representing administration.
- As elected members they are required to attend all safety meetings or arrange a deputy to attend and vote in their absence

Purpose & objectives of Safety Committee Meeting:

Health and Safety Committees should be established for the following purposes:

1. Objective of safety committee meeting are to educate & improve safety awareness among employees and workers.
2. To coordinate and control hazardous and improve working condition of the subcontractors.
3. Review the subcommittee minutes and statistic.
4. To advice the purchasing & stores dept in ensuring high quality as available of PPEs.
5. To increase and maintain the interest of employees in health and safety issues.
6. To convince managers, supervisors and employees through awareness and training activities that they are primarily responsible for the prevention of workplace accidents.
7. To help make health and safety activities an integral part of the organization's operating procedures, culture and programs.
8. To provide an opportunity for the free discussion of health and safety problems and possible solutions.
9. To inform and educate employees and supervisors about health and safety issues, new standards, research findings, etc.
10. To help reduce the risk of workplace injuries and illnesses.
11. To help insure compliance with federal and state health and safety standards
12. Reviewing and recommending training and educational safety programs for all employees.
13. Reviewing accident reports for trends and problem areas.
14. Involving other employees/departments in various projects and functions to reaffirm everyone's responsibility for health and safety.

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Electrical safety requirements are divided into four major areas;

- The electric equipment and installations used to provide electric power and light on jobsites;
- Safety-related work practices which cover hazards that may arise from the use of electricity at jobsites, and hazards that may arise when employees accidentally contact energized lines, direct or indirect, that are above or below ground, or are passing through or near the jobsites;
- Safety- related maintenance and environmental considerations; and
- Safety requirements for special equipment.

Working in nearness of Underground Cables

Damage to live underground cables during excavation work is the cause of a number of accidents resulting in injuries and disruption of supplies. On occasions such accidents have been fatal.

It is essential that all those involved, particularly machine operators are aware of the hazards.

Before excavation work commences:


- Ensure that employees have proper safe work procedures and adequate supervision
- Check plans to establish cable routes, depth and voltage
- Use cable location devices where necessary

During Excavation

- Regard all buried cables as live. Do not assume pot-ended cables are dead or discussed.
- Hand digging shall be employed when nearing the assumed line of the cable.
- Excavators and power tools should not be used within 0.5 m of the indicated line of cable
- Exposed cables shall be supported and protected against damage. They should not be used as hand and footholds

Plant Distribution

All wiring shall conform to specified regulations. Temporary wiring causes accidents and shall be avoided. All switchgears shall be freely accessible and being locked in the 'OFF'. Whenters shall protect all electrical installations. All electrical installations shall be provided with ELCB type shock guards.

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Main distribution unit

For the control and distribution of electricity on site 415 Volt Three Phase, and 240Volt single phase A.C.

Outlets units

Uses, portable tools, floodlighting and extension outlets to be protected by ELCB's.

Extension outlet units

Uses portable tools, local lighting, and hand lamps.

Markings

All supply, distribution and transformer units shall be marked with the warning sign with the word "DANGER" and indicating highest voltage likely to be present.

Earthing / grounding

All metalwork of the distribution systems and fixed appliances not carrying current shall be effectively earthed e.g.

- The metallic sheath and armoring of the incoming supply cables.
- The earth terminal supplied by the Supply Authority.
- A separate earth electrode system.
- Periodic maintenance, inspection and testing (with meager instrument for checking of earth pits shall be carried out).


Plugs: Socket Outlets: Couplers

Only components both single and three-phase supplies and is intended to prevent plugs designed for one voltage being connected to sockets of another. This is achieved by different positions of keyway in plug and socket.

Accessories shall be marked with maximum rated operating voltage and current.

Buried cable

- Cables shall be buried 0.5 m below ground.
- Protected with tiles or covers all in duct.
- Benchmark to indicate route.

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Cables on ground

- These are only permitted for short period of time
- Additional reinforced sleeve protection required
- To prevent tripping hazards cables shall be clearly marked.

Installations

- Installations shall be in accordance with plans drawn up by competent engineer.
- Any work or alterations shall be carried only in presence of competent engineer.
- The installation shall conform to electrical regulations.

Testing


- Every installation shall be tested in accordance with electrical regulations.
- Records of testing and inspection along with certification shall be maintained.

Testing and inspection shall include:-

- Visual inspection
- Continuity of final circuit conductor
- Continuity of protective conductor
- Earth electrode resistance
- Insulation resistance
- Polarity
- Earth fault loop impedance
- Operation of residual current device
- Weekly inspection shall be made on whole system including all portable tools and records shall be maintained.

Portable hand held tools

- Shall operate on 240 Volts
- Flexible cords shall be kept as short as possible
- Frequently checked for damage and repaired.
- Damaged cables shall be replaced.
- Long trailing leads over the ground or floor shall be avoided.
- Drums and reels shall be inspected regularly for overheating, which can cause fire.
- All portable tools shall be of double insulation type

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Fuses:

- Fuses usually blow for a reason. The reason shall be discovered before a fuse is replaced.
- Nails, screws, wire or silver paper never be used to replace fuses. It is illegal as well as very dangerous.

Lighting:

- Lighting is needed for safety; productivity; security.


Level of Illumination

- Illumination is measured in units of lumens (or lux), which the amount of light is falling on one square meter.
- Light meters are used to check levels of illumination. Illumination shall be measured at the actual work place not at the light fitting. There are factors that can affect the efficiency of lighting
 - Amount of daylight available
 - Cleanliness and maintenance of light fittings and reflectors
 - Reflections form walls/ ceilings
 - Distance of light source from work area
 - If the distance from the source is doubled the illumination will be reduced to one quarter (inverse square law).
- Maintain the LUX levels during the day & night time.

Plant / Site Lighting

Area lighting

- All areas shall receive light from at least two directions
- Fittings mounted on poles, towers and high masts must be securely stayed
- Fittings shall be spaced at not more than two or three times the mounting height.
- 240V is generally accepted for fixed floodlighting, mounted well above ground
- Dust and dirt on lights can absorb up to 20% of their output and cleaning is often cost effective in maintaining adequate levels of lighting for both working and safety.

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Safety Checklist

Cables


- Distribution cables must not cause a hazard at openings, passages, ladders, stairs etc.
- Ensure that cables are not lying on the ground unprotected from physical damage or wet conditions.
- Cables must not hang directly from nails, etc. which may cause insulation damage.
- Ensure that cables are protected from edges of sharp objects.
- Suspended cables shall not carry any weight. Rods or catenary wire shall support them.
- Is there an adequate supply of extension cables for plant use
- Remove all unapproved junctions and makeshift repairs

Plug etc

- See that covers, etc are not damaged
- Ensure that the splash proof covers are actually used
- Check that the correct plugs are fitted especially by sub-contractors
- Must be suitable for the plant conditions.
- See that plugs have not been forced into the wrong sockets
- Check that the correct connections have been made; color coding shall be distinctive
- Check that the cable grips are used and that the earth cable is fitted with some slack so that it is the last to be pulled out.
- No improvised junctions, nails, matches, silver paper, etc.
- Ensure that the correct type and rating of fuses are fitted.
- Have earth leakage circuit breakers fitted?
- Ensure that a competent electrician fits any made up leads/ extensions etc.

Power Tools

- Check for double insulation.
- Is the tool fitted with the correct plug; type and size?
- Arc cable trailing lead is not cut or frayed
- Is the cable protected from excessive flexing by rubber sleeve where the cable enters the tool?
- Are all screws in place and secure?
- Ensure that there are no cracks or pieces missing on the machine.
- Is the chuck in good condition and is the correct key attached?
- Check that any bit retaining mechanism is in working order


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Checklist for Operatives

- Disconnect machine before adjusting or working on it.
- Disconnect machine when not in use.
- Check that the color coding are correct
- Ensure that cables are adequate
- Do not use 'unofficial 'cables etc.
- Do not make makeshift repairs
- Report defects immediately to the competent person.
- Keep machine clean and free from dampness
- Fit all connection correctly- including water- proofing.
- Do not carry machine by cable
- Do not start or stop machine under load
- No work to take place within 9m of overhead lines on wood, concrete or steel poles, Within 15m of overhead lines on steel towers. Until the Electricity Board is consulted for advise.
- Distance measured horizontally at ground level from directly below the outermost conductor.


Lighting Maintenance:

- Isolate and tag the concern lighting circuit breaker.
- Tie the ladder to the ground supply; hold the ladder firmly by another person, to avoid slipping of ladder.
- Use safety belt if the height is more than 3 meters.
- Proper care should be taken while removing light fittings, wire guards, well glass etc. to avoid falling from elevation.
- Proper care should be taken while removing broken lamps while replacing the holders and chokes. Original color code has to follow while removing the chokes.
- Handle carefully the fused bulbs.
- If the breaker is tripped, do not restart without elimination of fault to avoid hazard.


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Temporary Connections:

- Where temporary connections are envisaged, use correct size cable. In case of 230V test boards used, 3-core cable and third core should be earthed.
- Temporary cable should be laid from above 3 meters and properly tied them. Any joints are required; the same shall be properly insulated.
- When the job is completed as early as possible, removed the temporary connections and store properly.
- Give only 24V hand lamps, where 230V hand / flood lamps are required, the same shall be installed above 3 meters.
- Use only 3 core cables for single phase power and third core should be earthed to metal part.
- Ensure welding machines are properly covered to avoid any water entry.
- Ensure earth / welding cables joints are properly made.
- Do not run welding cable on the live power cables.

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- Only operate equipment for which they are trained and authorized.
- Material should be properly loaded considering its weight, dimension, capacity of the carrier, centre gravity of the load, clearance required for safety, etc.
- Load must be properly packed or tied before transportation.
- Vehicle should be in good working condition.
- All the vehicles must have efficient brakes, horns lights.
- The transport vehicle should not be over load. No material should not be project above the height of the side panel or beyond the side. Red caution flags or red lamps in the night should be displayed on the project end.
- The vehicle should not ply beyond the permissible speed limit. Speed limit inside factory / site premises should be strictly followed.
- The driver should observe the instructions for crossing the level crossing overtaking and taking turn etc.
- None should get up or get down from a moving vehicle.
- Men should not sit on the sides of the panels or on the top of drivers cabin.
- Men should not sit near the load or over the load where there is possibility of rolling or rolling or shifting due to sudden application of breaks.
- Follow the Manufacturers recommendation for tyre pressure, fuel and air ratio, fuel quality (e.. octane no. in case of petrol), lube quality, loading etc.
- Carry out maintenance as per Manufacturer recommendations for maintenance as per Manual / Checklists; always purchase Fuel, additives, lubes and spares to be purchased from Company authorized outlets only.
- Ensure that rear mirror, horn, back horn, hand brake are in working condition.
- Do not use mobile phones while driving.
- Possess documents like Driving License, Certificate of Registration, Fitness Certificate, Pollution under Control Certificate etc. Ensure that the person driving is not color blind.
- Ensure that no other person sits on the vehicle except driver.
- Whenever reversing the vehicle ensures that there is always someone to guide the movement of vehicle.
- Always park the vehicle in such a way that the front faces towards the main exit-way.
- In case of leakage in fuel system, vehicles shall not be parked within 6 m of any source of ignition or fire. Never park vehicles near to sources of high heat.
- Never be near the vehicle / never use of mobile phone during fuel refilling.
- Never drive if abilities are impaired by, for example, alcohol, poor vision or hearing, ill health or drugs whether prescribed or not.

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Good housekeeping is an important element of accident prevention. It should be planned at the beginning of the job and carefully supervised until the final cleanup. It is recommended to have a regular clean up in all cure jobsites. However housekeeping should be the concern of all supervisors and engineers in their area of working and not left for the cleanup crew. In any case housekeeping should be a part of daily routine with clean up being a continuous procedure.

Making the Work Area Safe

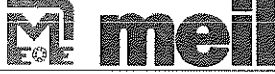
| Hazard | Remedy |
|----------------------|---------------------------|
| Wet/ uneven surfaces | Clean up/ report spills |
| Improper lighting | Keep areas well lit |
| Winter weather | Wear the right shoes |
| Wrong tools | Use job-appropriate tools |
| Poor housekeeping | Clean clutter |
| Big loads | Carry smaller loads |
| Not enough time | Slow down |

Most workers often trip or stumble over unexpected objects in their way; thus, the importance of housekeeping is a key strategy in the prevention of slips, trips, and falls.

Housekeeping

Housekeeping do's

- Keep everything at work in its proper place.
- Put things away after use.
- Have adequate lighting, or use a flashlight.
- Walk and change directions slowly, especially when carrying anything.
- Make sure the teeth or head on a wrench is in good shape and won't slip when you pull on it.

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Housekeeping Don'ts


- Don't leave machines, tools, or other materials on the floor.
- Don't block walkways or aisles with machines or equipment.
- Don't use a "cheater" on a wrench; get a larger wrench with a larger head or handle, if you need it.
- Don't leave cords, power cables, or air hoses in walkways.
- Don't place anything on stairs.
- Don't leave drawers open.
- Don't carry or push loads that block your vision.

Simple rules for housekeeping-

1. **Storage area:** - all material should be maintained in neat stockpiles with well laid aisles and walk ways for ease of access. There shall not be any projections in the walk ways.
2. **Work areas:** loose materials, scraps, tools, etc. shall not be allowed to be lying in the working areas especially in the vicinity of ladders, ramps, stairs, etc. this is more important at height where the loose materials are laid to fall down. Spills of oil & grease should be removed immediately. An effective means of preventing loose pieces lying dangerously at height in the provision of suitable receptacles for waste and scrap pieces
3. **Scrap yard:** wooden scrap yard should be well away from any gas cutting or welding operation and No Smoking shall be strictly ensured there.


All other combustible scrap like cotton waste, wooden boxes, and empty paint tins shall be disposed off safely then and there

4. **Lighting:** - Adequate lighting should be provided in and around all work areas, passage ways, stairs ladders & other areas used by personnel.
5. **Openings in floors:** All openings in floors where our workmen are liable to work or even pass through shall be either closed or barricaded. If they are closed, a visible warning sign shall be kept to indicate the opening below the cover.

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Excavation, Piling & other related works.

1. Sides of all excavations must be sloped to a safe angle not steeper than the angle of repose of the particular soil. Angle of repose for various soils are given in table -2. If it is not possible to give a proper slope, the sides of excavation, where there is danger of fall or dislodgement of earth or any materials shall be securely supported by timber or any other type of shoring. Where the excavation is being carried out with Poclain step down procedure should be followed.
2. No excavation or earth work below the foundation level of any adjoining buildings in an existing plant / factory shall be taken up unless adequate steps are taken to prevent damage to the existing structure.
3. Every accessible part of an excavation, pit or opening in the ground into which there is danger of person falling, shall be suitable fenced with a barrier up to a height of three feet as close to the edge of the excavation of practicable.
4. Cutting shall be done from top to bottom. No undercutting of side of excavation shall be allowed.
5. All narrow trenches 14 feet or more depth shall at all times be supplied with at least one ladder for each 100 ft in length or fraction thereof ladder should be extended from bottom to the trench to at least three ft., above the surface of the ground.
6. The side of trench which are 5ft . or more in depth shall be stepped back to give suitable slope or securely held by planking, strutting and bracing, so as to avoid the danger of side collapse.
7. Before starting any excavation of any description in the existing plant / factory area premises, permission in writing (WORK PERMIT) must be obtained from the Electrical Division, Civil Engineering & Design Department of the clients to avoid any damage to the underground electric cables or pipeline.
8. No loose materials or load shall be placed or stacked near the edge of any excavation so as to endanger the lives of person working below.
9. Excavation area must be properly fenced and marked with the suitable warning boards or lights at all times.
10. All workmen working inside the trench / pit shall necessary wear safety helmets and those who are working in the slopes or benches of the pit shall use safety belts also.

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The transportation, storage, handling & use of explosives are governed by explosive act. Strict compliance with the same and the local Law & regulations are also to be referred while dealing with the explosives.

The following four unsafe acts are strictly forbidden while handling explosives.

1. The use of possession of intoxicants on or around the job.
2. Horse play or practical jokes.
3. Smoke or use of open lights.
4. Use of mobile phones.

Blasting records:

The following records have to maintain in all quarries while handling the explosives.

A. Blasting record for each blast indicating.


- a. Date & time of blast.
- b. Number of holes.
- c. Type of explosives used.
- d. Amount of charge per hole &
- e. Firing pattern & sequence.

An inventory of all explosive received, placed in removed from & returned to storage magazines maintained current at all times.

Only licensed blaster shall be allowed to handle explosives

B. Transportation

- a. Explosives should not be carried in the same vehicle with detonators unless the detonators are carried in a separate approved container.
- b. The vehicle should be equipped with a non sparking metal or wooden floor the sides should be high enough to prevent the explosives from falling off or equipped with a close body. If any open body truck, a fire & water proof tarpaulin shall be used to cover explosives.
- c. Two fire extinguishers must be provided in the vehicle.

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- d. Congested traffic should be avoided while transporting the explosives. Unnecessary parking at hotels, garages, filling stations, etc. should be avoided.
- e. Unauthorized persons or flammable & corrosive substances shall not be allowed in the truck carrying explosives.
- f. Smoking is not allowed in & around the vehicle carrying explosives.

C. Storage

- a. Explosives should be stored only in approved storage magazines however small the quantity shall be.
- b. While taking explosives for actual usage, it shall not be placed near the source of heat or water.
- c. Smoking or possessing crotches, etc. near the magazine is prohibited.
- d. Manufacturer should be consulted, if nitroglycerine from deteriorated explosive has leaked on to the floor of a magazine. The floor should be desensitized with an agent approved for that purpose by the manufactured.
- e. Detonators should never be stored in the same magazine with any other explosives.
- f. Leaves, grass, bush or debris shall not be allowed to accumulate within 25ft of an explosive magazine.

D. Using Explosives.

- a. Explosives boxes (cases) should not be opened using metallic tools.
- b. Replace the cover of the case after the required quantities of explosive have been taken out.
- c. Smoking or any other sources of fire are prohibited within a radius of 100 feet from the place where the explosives are being handled or used.
- d. Only the fuse and nothing else shall be inserted in the open end of the blasting cap.
- e. Explosives caps or fuses shall not be carried in the pocket of clothing, etc.
- f. Children or Unauthorized persons are totally prohibited in the blasting area.
- g. Deteriorated or damaged explosive caps and other accessories shall not be used it shall be returned to the manufactured.
- h. Intensity of the charge to be used must be well calculated and safe enough to prevent any damage to nearby structures due to shock & vibration resulting from the explosion. The

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charge can be covered with blasting mats, used conveyor belts & sand bags to prevent splinters flying off especially in running plants.

E. Drilling & loading

- a. Before drilling is started, possible presence of unfired explosives should be carefully checked. Never drill in the butts of old holes.
- b. Before loading the condition of the holes should be checked either with wooden tamping poles or measuring tape. Especially hot materials of any kind like broken drill bit etc are very hazardous.
- c. No holes should be loaded except those that are to be fired in the next round of blasting. Holes loaded during one shift should be fired on the same shift.
- d. To avoid miss fire, the detonator should be completely inserted length wise in the cartridge, fastened in such a manner that it cannot accidentally be pulled out.
- e. Cap crimpers of proper design should be used for crimping blasting caps onto fuse- not the teeth or a knife.
- f. The diameter of the hole drilled should be at least 3mm more than the dia of the cartridge.
- g. Blasting shall be carried out only during lean hour – **Say during lunch time, night hours or after taking the work permit.**

F. Warning signals


A standard warning signal and all clear signal should be used before & after firing and inspection. All personnel working in the area and nearby should be made aware of this established warning procedure.

At the time of competent persons HSE equipped with red flags with vessels should be posted at all possible approaches to the blasting area to stop traffic and bypassers.

G. Firing

In electrical firing, following safe practices are recommended to avoid any trouble.

- a. All electrical connections should be good & rigid.
- b. The blasting machine should be in good order and of sufficient capacity to fire all the electric blasting caps connected in the circuit. It may be tested with a rheostat.

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- c. Generator type blasting machine shall be operated few times before making the connections to prepare it for the maximum generation of current. This type of blasting machine should be operated with maximum force.
- d. Electric detonators or delay electric detonators of different manufactures should not be used in the same blast.
- e. The resistance of circuit should be measured with blasting galvanometer before attempting to fire.

H. Misfire


There is no absolute safe method for handling misfire. But misfires can be prevented.

- I. By proper use of high-grade blasting supplies.
- II. By testing each electric caps with a blasting galvanometer before loading
- III. By testing the complete circuit before firing the blast.

However if a misfire does occur it should be handled very carefully, only by experienced persons.

The safest way to dispose of a misfire is to reshoot it, if throw of rock can be tolerated. When the trouble is caused by fault connections and if the leg wires are accessible, test the blasting cap with the galvanometer and try to blast it in the usual manner after giving connections properly. If the shot fails again, or if the wires are in accessible, or if caps and fuses are being used, try to shot the hole with a fresh primer. If this also fails, the stemming should be removed carefully, a new primer inserted and then fired.

Unused, spilled or deteriorated explosives should not be abandoned. It should be preserved and disposed only by competent person and experience person. Wood, paper or fibre used in packing explosives should be burned only in an isolated outdoors location. After the burning has started, no person shall be allowed within 100 feet of the place of burning.

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Objective:

To facilitate the rapid implementation of relief or emergency measures during incident, disaster and prevents minor incidents with developing into potential major incidents.

Matter whether the injury or the illness is caused by the work they do. What is important is that they receive immediate attention and that an ambulance is called in serious cases. First aid at work covers the arrangements employers must make to ensure this happens. It can save lives and prevent minor injuries becoming major ones.

The Health and Safety (First-Aid) requires employers to provide adequate and appropriate equipment, facilities and personnel to enable first aid to be given to employees if they are injured or become ill at work.

What is adequate and appropriate will depend on the circumstances in a particular workplace.

The minimum first-aid provision on any worksite is:


- A suitably stocked first-aid box with materials
- An appointed person to take charge of first-aid arrangements.

It is also important to remember that accidents can happen at any time. First-aid provision needs to be available at all times people are at work.

A first aider

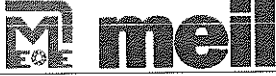
A first aider is someone who has undergone an HSE approved training course in administering first aid at work and holds a current first aid at work certificate. Lists of local training organizations are available from the local environmental officer or HSE Offices. The training should be repeated every three years to maintain a valid Certificate and keep the first aider up to date.

The First aid box shall be placed under the charge of Safety Officer or Welfare officer on in their absence a qualified First Aider

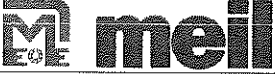
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Permit to Work:

- A. The permit to work (PTW) system will be followed to ensure compliance with the standards
- B. PTW will be used in all common areas. Different types of work will include
 - a) Height work permit refer MEIL/SAFETY/F-09/Rev.01
 - b) Electrical work permit refer MEIL/SAFETY/F-10/Rev.01
 - c) Hot work permit refer MEIL/SAFETY/F-11/Rev.01
 - d) Excavation work permit refer MEIL/SAFETY/F-12/Rev.01
- C. The employees will maintain high standard of hygiene at work.
- D. The initiation date of permit, estimated start and duration of permit will be specified. The permit validity for maximum duration of 08 hours will be specified.
- E. The brief Job description of the work and equipment will be provided and risk assessment will be done to determine the conditions of work and plant conditions. PPE will be provided.
- F. The request for permit to work will be detailed with names of responsible person.
- G. The Safety Officer will review PTW permit request for worksite safety and its contents and relevant attachments and provide endorsement. Contact numbers and special instruction will be provided by Activity In charge.
- H. Inspection of work location, reviewing of condition stipulated in permit and attached documents will be carried out in accordance with Health and Safety Regulation.
- I. Safety Officer will give permission to proceed after reviewing the permit and relevant documents attached.
- J. The appropriate column in the attachment will be signed off once the work is completed in accordance with the permit requirements.
- K. The work inspection, acceptance and reinstatement of the completed work in accordance with permit requirements will be done by activity in charge.
- L. Gas test authorization, if required, will be conducted and endorsed on site by Safety Officer. The work will be stopped when ever an unsafe acts or conditions are encountered. The work will commence only after these unsafe acts or conditions have been restored and endorsed
- M. The safety requirement for all classes work will be mandatory and applicable class of work will be reviewed and completed in conjunction with hot category.
- N. Permit-to-Work-System will be adopted in all restricted & unrestricted areas.
- O. One copy of work permit will be posted at site during the PWT is being carried at work site

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- The materials are stacked with passage to reach them. The aisle is marked. Materials should not protrude beyond the marked area posing tripping hazard.
- Name boards shall be displayed to mention the place for every item
- The racks installed must be supported well to prevent from falling.
- To reach the rack top, person should not climb on the rack shelf, ladder should be used.
- Vertical stacking of materials should not exceed the prescribed norms, posing falling hazard because of imbalance.
- Adequate lighting is provided.
- Flammable materials like Dissolved acetylene, paints etc are stored under well-ventilated shed. Electrical connection in these locations should be proper and maintained well such that they do cause short circuit. Smoking, carrying matchbox or any other fire causing materials is prohibited in these areas.
- Sufficient fire extinguishers are kept at conspicuous places and the path to reach them shall not be blocked anytime.
- Toxic materials are labeled and kept at secluded place where only authorize persons shall handle. The MSDS of the chemicals.
- Nail pullers shall be used whenever possible to remove nails from boxes and crates. Metal strapping should be cut with proper safety tool.
- Barrels and drums shall preferably be placed on end. If placed on their side, these shall be provided with racks or blocked so these cannot roll.
- Oils, greases and paints shall not be openly stored at any time.
- The scrap pile and junk material shall be kept as orderly as conditions will permit. Extreme care shall be used in handling scrap material to prevent personal injury.


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Storage of Cylinders:


1. Oxygen and acetylene cylinders should be stored separately since any mixture of gas leakage could be highly explosive. Storage should be preferably be on hard standing in the open air under a shelter, but if interior storage is necessary, rooms must be well ventilated.
2. Housekeeping should be maintained .The area inside and around the shed should be clear from litters.
3. Acetylene and oxygen are either kept minimum a distance of 10feet away or a partition is placed between them.
4. Acetylene & Oxygen cylinders, whether full or empty, should always be kept upright.
5. Full cylinders should be kept separate from empties. Name boards are displayed to identify the cylinders.
6. Cylinders should be shielded from direct sunlight or other heat to avoid the build up of excess internal pressure, which might lead to gas leakage or eventual bursting of the cylinder walls. Some protection should be provided in ice and snow conditions to avoid a reduction in pressure, which would lead to difficulties in operation.
7. Storage compounds should be sited well away from risk areas and all oxygen cylinders especially should be kept off oil and grease since these will ignite violently in an oxygen concentration.
8. “NO SMOKING” signs are displayed

Diesel / Petrol storage area:

- Approved quantity of diesel / petrol is stored.
- Diesel drums are stored on a hard surface preferably on a concrete floor. The floor is sloped towards a corner where a sump is made for collection of the spilled oil.
- They are kept under a shed.
- Adequate numbers of foam type extinguishers are installed.
- Housekeeping should be maintained .The area inside and around the shed should be clear from litters.
- Caution Boards on fire hazards like, “NO SMOKING” shall be displayed.
- Others flammable materials should not stock with the diesel (LPG Gases)

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- Installation of bar bending/cutting M/CS connection tapped through ELCB, proper joint, proper rating power cable in use, double earth provided
- Power cable should be routed through overhead
- While Shifting of reinforcement steel workmen trained for safe handling of rebar
- Authorized operators in service
- Trained workmen ,sufficient work place available
- Scrap disposal yard earmarked, daily collection of bar cut pieces observed
- Trained operator, sufficient machines available
- Proper eye protections are in use
- Safe Material handling technique in application
- Proper lighting should be provided during night time
- Proper access available to shift the reinforcement steel
- Suitable PPEs (hand gloves, goggles) should be used

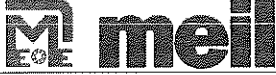
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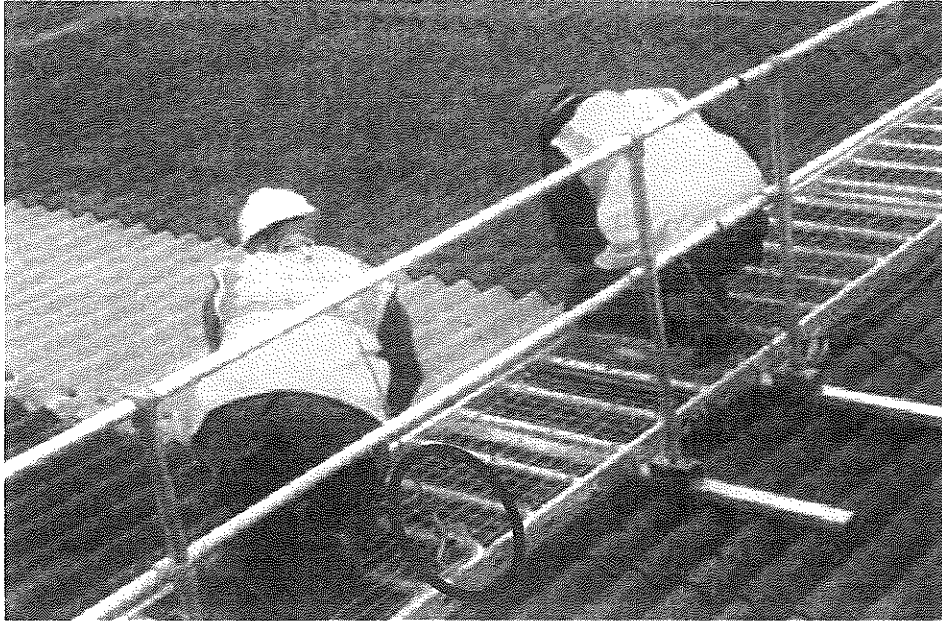
There is no minimum height requirement for work at height. It includes all work activities where there is a need to control a risk of falling a distance liable to cause personal injury. This is regardless of the work at height involved or the height at which the work is performed. It includes access to and egress from a place of work and therefore includes:

- Working on a scaffold or from a mobile elevated work platform (MEWP)
- Sheeting a lorry or dipping a road tanker;
- Climbing permanent structure, such as a gantry, water tank or electrical pole or telephone pole & etc.
- Working near an excavation area or cellar opening if a person could fall in to it and be injured;
- Work carried out like painting and decorator at height.

Precautionary measures:

- When work is carried out at height, the employer shall take suitable & sufficient measures to prevent, so far as is reasonably practicable, any person falling a distance liable to cause injury (e.g. the use of guard rails.
- The employer shall take suitable and sufficient measures to minimize the distance and consequences of fall (collective measures, for example safety nets, must be take precedence over individual measures for example, safety Harnesses)
- Provide the additional trainings those are working at height.
- Arrange the required level of supervision.
- Use of guard rails, toe-boards, working platforms and means of access and egress.
- Provision of foot and hand holds.
- Arrange required PPEs such as safety helmets and harnesses
- The presence of fall arrest systems. Such as netting or soft landing system
- Check the health status of the workers.
- Working condition & weather condition
- Arrange adequate barriers and edge protection
- Eliminate or avoid working at height
- Work from the existing safe workplace provided.

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Workmen wearing harnesses attached to a work positioning line which is fitted to the staging

The most common types of fall arrest equipment as safety harness, safety nets.

Safety Harness: Should only be used alone when conventional protection, using guard rails, is no longer practicable. Such conditions occur when it is possible to fall 2m or more from the open edge.

The following points are considered when safety harnesses are used:

1. The length of fall only is reduced by a safety harness. The worker could still be injured due to the shock load applied to him when the fall is arrested. A free fall limit of about 2 m is maintained to reduce this shock loading. Lanyards are often fit with shock absorbers to reduce the effect of shock loading.
2. The worker must be attached to secure anchorage point before they move in to an unsafe position. The lanyard should always be attached above the worker, whenever possible.
3. Those who wear the safety harness must be able to undertake safety checks and adjust the harness before it is used.

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Electrical arc welding & gas cutting

To prevent fire & explosion risk -

Risk Control Measures -

Ensure that all combustible materials like paints, thinner, cotton waste paper etc. are isolated from the work area. If not possible the same should be covered with fire resistance blankets.

Ensure that Fire Extinguishers are available.


Heat spread due to radiation should be prevented.

Do not weld by keeping fire-prone material inside your pocket

To prevent electrical shock –

Risk control measures -

- Never dip hot electrode holder in water for cooling as it may expose the welder to electric shock.
- Welder must wear rubber gloves inside the leather gloves, where there is probability of exposing the welding electrode with water (like rain, sea water etc.)
- Conductors should never be left exposed.
- All the welding connections should be done with proper size of lugs.
- Inspect insulation on electrode holders, cables accessories, regularly and replace all worn out and damaged cables immediately.
- Welder should switch off the current to the electrode holder and remove the electrode whenever not in use.
- Polarity of the electrode should never be changed.
- Welding machine's terminals should be covered to prevent accidental shorting out by the metallic objects.
- The welding machine should be properly earthed.
- Do not wrap welding cable around your body.

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To prevent burn injury -

Risk control measures –

- Only Standard make holders should be used.
- Suitable metal bins shall be provided for spent electrodes stubs, as they are usually hot when discarded and can cause severe burn injury.
- Strike the arc only on the objects to be welded.
- In order to prevent severe leg burn injury, welders should wear Safety Shoes, Leg Guards or Leggings.
- In order to prevent hand burn injury due to welding spatters wear leather gloves. Gloves should be long enough to protect wrist and forearms.
- A shield can be fitted between the electrode holder and the handle to prevent live elements from being touched.

To prevent the explosion of empty drum/ vessels -

Risk Control Measures –

Welders have been known to use apparently empty drums to support a temporary bench for welding operations. These drums may contain dangerous elements and they can explode due to heat or spark or accidental contact of electrode.

Do not use paint drum for sitting while carrying out welding.


While carrying out any hot work for closed vessels arrange to open all the manholes, purge air.

To prevent the miscellaneous injury -

Risk control measures –

Red Eye: - Welder's helper is required to protect from the ultraviolet radiation emitted in the welding. One most common injury occurred is red eye. Special types of goggles are available to prevent welder's helper from the red eye.

Hand Burn Injury: - After welding the surface becomes hot, if anybody touches it, severe burn injury can occurred.

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One common accident occur frequently in welding is injury due to welding electrode. Welder after completion of his job raises the electrode. If welder's helper is sitting nearby, severe eye injury can occur due to electrode trucking his eyes.

Other common accident is fall of hot used electrode on the person working nearby. Welder when release used hot electrodes, it can fall on the person working below and fire or burn injury can result.

Miscellaneous Gas Cutting Safety Measures: -

Risk Control Measures –

- Wear personal protective equipment. Wear welding gloves, helmet, leather shoes, Welding goggles, and other personal protective equipment to help prevent weld burns and injury.
- Fasten cylinders securely. Do not handle cylinders roughly. Chain cylinders in an upright position to a wall or cart. When regulators are not on cylinders, keep safety caps in place. Caps will prevent damage to cylinder valves.
- Never use oil on welding equipment. Oil and grease may ignite spontaneously, when in contact with oxygen.
- Open cylinder valves correctly. Open the valve on the acetylene cylinder no more than three-fourths of a turn so it can be closed quickly in case of emergency. Open the valve on the oxygen tank fully.
- While welding or cutting, leave the valve wrench in position.
- Keep the tip pointed away from your body. Do not saturate your clothing with oxygen or acetylene. Before and while lighting the flame, keep the tip pointed away from your body.
- Light the flame with an approved lighter. Using matches to light the torch brings fingers too close to the tip.
- Set the operating pressure carefully. Never use acetylene at a pressure over 15 psi. Follow the manufacturer's recommendations for the correct operating pressures for the metal being welded and for the tip size being used.
- Do not smoke or allow anyone else to smoke near the oxy-fuel gas welder. If fuel gas were to leak from the unit, smoking could provide ignition and cause a fire or an explosion.

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- Treat the flame with respect. Keep the flame and heat away from the cylinder, hoses, and people. Never lay down a lighted torch. Be sure the flame is out before laying down the torch. Never walk around with a lighted torch.
- Control flashbacks and backfires. Make certain that reverse flow-check valves and flash arrestors are installed on the oxygen and acetylene lines.
- Do not leave the work area until the cylinder valves are closed. Be sure the cylinder valves are closed and pressure is relieved from the hoses before you leave the work area.
- Never stand in front of a regulator while you are opening a tank valve.
- Do not weld or cut on containers that have held flammable materials.
- Remove regulators and replace protective caps before transporting cylinders.
- Store oxygen cylinders away from acetylene cylinders. A non-combustible wall at least 5 feet high should be used to separate cylinders.
- Handle hot metal with pliers or tongs. Do not leave hot metal on the welding table because unsuspecting persons may touch it and be burned.
- Check connections for leaking gases. To prevent fires or explosions, use soapy water to check connections for leaks, can be greatly minimized.

Snap out can occur during the use when: -

- Both the regulators at incorrect pressure,
- Torch nozzle obstructed
- Nozzle held too close to the work

Corrective Action: -

- Completely shut both torch valves.
- Check the regulator setting
- Check the cylinder's pressure
- Check the nozzles
- Relight

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Backfire can occur on lighting up when: -

- Regulator not set to correct pressure
- Light applied before the flow of the gas mixture properly established.

Corrective Action: -

- Close both the torch valves
- Check the cylinder pressure
- Check the adjust regulator setting.
- Cool the torch and check the nozzle orifice for obstruction relight.

Flashback: -

Preventive Actions

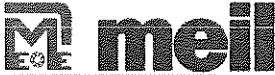
- Use Flash-Back Arrestor
- Ensure all connections are tight
- Ensure the cylinder's valve's are open and torch valves are closed
- Set regulators to the required pressure
- Purge each hose separately and consecutively by opening the torch valves and allowing the gas to flow for the sufficient time to ensure that the only pure gas will remain in the hoses

Close the valve for each gas

Corrective Action


- Close both torch valve
- Extinguish hose if alight

Close both the cylinder's valves.

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Scaffolds or work platforms shall not be altered once they are erected and properly tagged. All scaffolding shall be inspected and approved by the concerned department / HSE department and by competent person.

- Guardrails, mid rails shall be installed on all open sides of scaffolds. Guardrails, mid rails and toe boards should be constructed from components furnished by the manufacturer. Where this is not possible, sound 2 x 4 inch lumber for (or the equivalent) guardrails and mid rails and 1 x 4 inch lumber for toe boards.
- Scaffold planks must be at least 2 x 10 inch full thickness lumber scaffold grade, or the equivalent.
- Scaffold planks shall be cleaned or secured and must be extend over the end supports by at least six inches but not more than 12 inches.
- All scaffolds should be fully planked and constructed with a safety factor.
- All scaffold members shall be visually inspected before each use. Damaged scaffold members must be removed from service.
- Access ladders shall be provided for each scaffold. Climbing the end frames is prohibited unless their design incorporates an approved ladder.
- Approved mud sills or other rigid footing, capable of supporting the maximum intended load , shall be provided.
- Scaffolds shall be secured to the building or structure at intervals not to exceed 30 feet horizontally and 26 feet vertically.
- Scaffolds shall not be overloaded. Materials should be brought up as needed. Access materials and scrap shall be removed from the scaffold immediately on completion of the work.
- Barrels, boxes, kegs and similar unstable objects shall not be used as work platforms or to support scaffolds.
- Where persons are required to work under a scaffold a screen of 18 gauge, 1/2 inch wire mesh or equivalent protection is required between the toeboard and the guardrail.
- Overhead protection is required if employees working on scaffolds are exposed to overhead hazards

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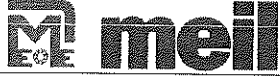
General Rules for use of Scaffolding

1. Scaffold should not erect near to excavation area and vice versa.
2. Engage experienced personnel only while working on scaffold.
3. Proper supervision is ensured during work time.
4. Scaffold tag system should be implement for use.
5. Lateral supports at every 6 meters intervals with permanent structure
6. Verticality of scaffold is ensured to the norm of tolerance 1mm per meter
7. While erecting the scaffold stay away from the erection area to safe guard from fall of materials.
8. Working Platform made with 600 mm width toe guard & Secured both sides with handrails & Use of Full body Harness with Double lanyard is ensured for avoid of personal falling.
9. No loose material is allowed to keep at top of the scaffold.
10. Hand tools shall be secured so that it will not even if missed
11. Workers ability to work at height is physically examined and authorized to work at height.
12. No work on scaffold is allowed to carry out during raining or immediate after rain.
13. Adequate illumination of 150 lux is ensured at workplace.
14. No materials are thrown from height, educated the workers in safe material handling operation
15. Competent supervision shall be improved.
16. Using the pulley all materials while lower.

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CONFINED SPACES

- Confined or enclosed spaces occur on most projects. Confined or enclosed spaces are defined as any space having a limited means of access or that is subject to the accumulation of toxic or flammable contaminants or that may have an oxygen deficient atmosphere. Confined or enclosed spaces include, but are not limited to, caissons, storage tanks, process vessels, bins, boilers, ventilation/ exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open top spaces more than four feet in depth, such as pits, tubs, vessels, vaults, and sumps.
- Prior to entering a confined space, the following precautions must be taken :
- Employees must never enter a confined space without approval of their supervisor and / or the Safety & Health Services department and until the atmosphere has been tested by a designated person and determined to be safe. Confined space permits or tags must be posted prior to entry.
- Confined space work operations often require additional safety precautions. The precaution will be explained by your supervisor prior to the start of work.

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LADDERS:

- All ladders shall be of proper length and of a good condition.
- All ladders shall extend at least one meter above the level of the serves.
- Broken or damaged unaccepted ladders shall not be used.
- Do not splice together short ladders to make a longer ladder.
- All straight and extension ladders shall be equipped with safety feet or be secured at the bottom
- Vertical ladder shall not exceed 6.0 meter.
- All straight ladders shall be secured at the top to prevent movement.
- Ladders must not be placed against movable objects.
- The base of straight or extension ladders shall be set back a safe distance from the vertical (approx. one fourth of the working length of the ladder.
- Ladders used for access to a floor or platform shall extend at least 36 inches above such floor or platform.
- The areas around the top and base of ladders must be free of tripping hazards such as loose materials, trash, cords, hoses and leads.
- Ladders that project into passageways or doorways where they could be struck by personnel, moving equipment, or materials being handled, must be protected by barricades or guards.
- Employees shall use the ladder when ascending or descending.
- Be sure that your shoes are free of mud, grease, or other substances that could cause a slip or fall.
- Do not carry materials up or down a ladder. You must use both hands when going up or down a ladder.
- Always move the ladder to avoid overreaching.
- Stepladders shall be fully opened to permit the spreader to lock.
- Employees must never stand on the top two steps of a stepladder.
- Metal ladders shall not be used for electrical work or in areas where they could contact energized lines.