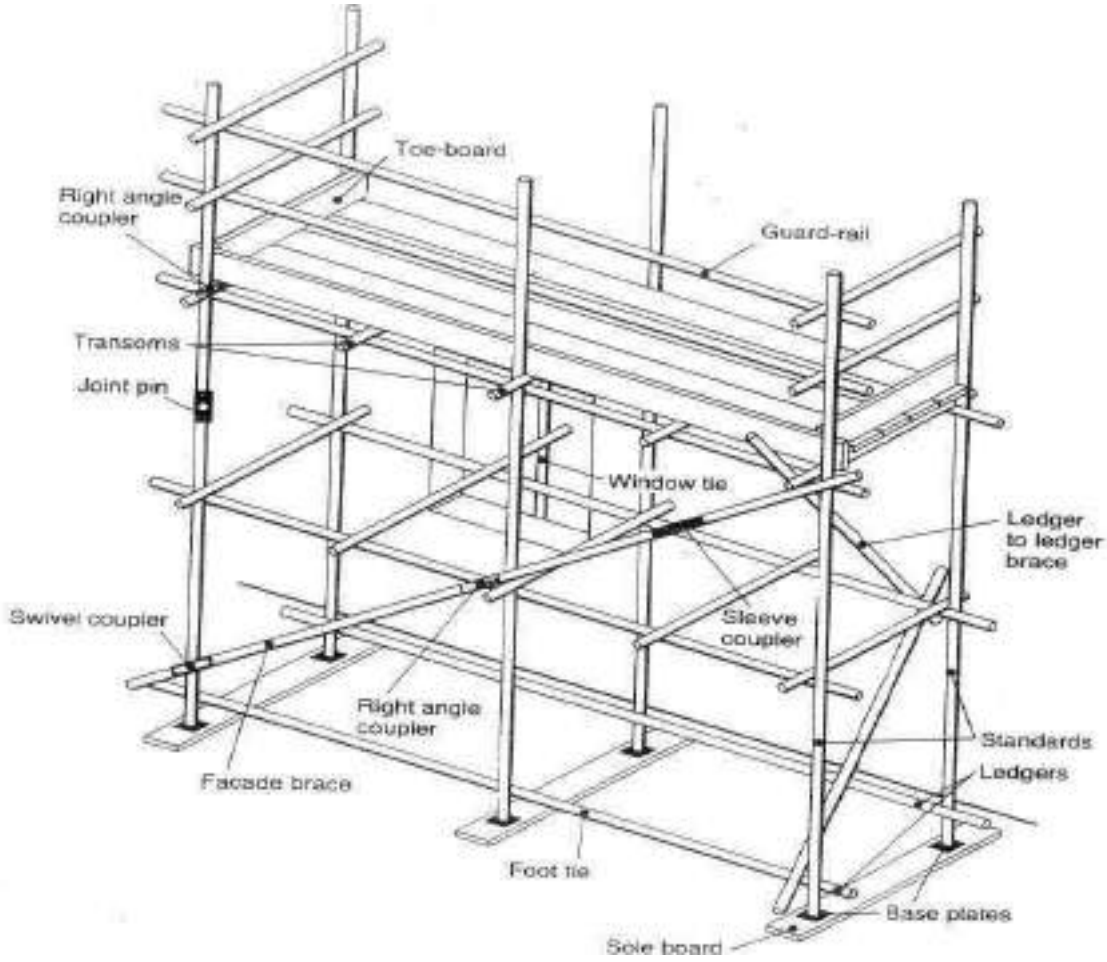
- Scaffolding material shall be inspected and used, only if found in good condition.
- Provide metal base plate is used under all upright or standard scaffoldings. Correct type of couplers shall be used for all connections.
- Plumb and level scaffoldings as erection proceeds, so that braces will fit without forcing.
- Fasten all braces securely.
- Working platforms shall be provided with guards. This should consist of top rail, mid rail, and toe board. The toe board shall be of minimum height 100 mm, while the mid rail and top rail shall be at heights of 600 mm and 1200 mm respectively.
- Do not use ladders or makeshift devices on top of scaffoldings to increase the height.
- Shall be placed at least 75 deg. to the floor.
- Fall arrestor to be used where ever applicable.
- The following safety tips are as guidelines in avoiding job-site situations that could prove dangerous to scaffold workmen.
- Don't Ride Moving Scaffold; and remember scaffold units are limited in height to 4* times
- Their narrowest base dimension (unless base is widened by outriggers or more end frames; or tied into building.) Always keep casters locked. (except tore-spot)
- Don't Climb Braces: Use the steps provided on most steel scaffolds to climb up to or down from work levels. Use scaffold climbing ladders where required.
- Protect Working Levels: Use overhead canopies to protect workers on lower work levels when work is being done overhead. Rope off un safe areas underneath scaffold or provide wire mesh around work area.
- Use Double Guard Rails; and toe board so exposed side sat platform heights of 1.8 meter or more.

Illustration of a Sample Independent Scaffold



15.6.5 Ladders

- Fall protection is not needed when climbing up or down ladders less than 20 feet/6.1 meters, using 3 points of contacts.
- Portable ladders, steps and trestles should only be used for light duties of short duration. Otherwise, properly constructed means of access should be provided.
- Aluminum ladders can generate sparks when struck against rusty iron, so it must be used in Hazardous Areas with special care.
- Aluminum ladders must not be used in areas where they might be splashed with acids or alkalis ; e.g. Utilities Area

- Ladders with metal reinforced, Damaged or rotten stiles, Missed footing on ladder rungs must not be used.
- Over-reaching and over-balancing is not allowed.
- Every time before use, the user will carry out inspection of ladder.
- If the work to be done necessitates the use of both hands, a safety belt must be used.
- Tools and materials must not be hand carried by persons ascending or descending ladders. Where applicable light tools should be carried in pockets, tool belts or shoulder bags, provided they do not impair movement and are held securely.
- Rungs, stiles, or treads to be checked for bending, twisting or signs of abuse or undue wear.
- Feet to be fitted with various types of bases and in good order. Synthetic non-slip, wooden or metal.
- Non-slip stair treads mats of stepladders, should be fitted and in good condition.
- In case of moving ladders fitted with wheels, Hinges and locking devices to be secure and in good working order.
- All portable ladders must be in good condition as per the site norms.
- Ladder shall extend 3' to 4'above the point of Landing and topmost 3 rungs shall not be used.
- Ladder is checked visually for defects before every use.
- Ladders shall not be used in a horizontal position as runways or scaffoldings.
- Ladders shall not be placed in front of a door that opens toward the ladder unless the door is locked, blocked or guarded.

15.6.6 User Ladder Safety Checklist

The following check list specifies the main points to remember when using ladders:

- Do not erect:
- On sloping ground
- On top of movable objects
- In high wind
- In front of a door which may be opened
- Against a slippery or unstable surface

- At a shallow angle, or use horizontally as a plank or bridge
- Leaning to onside

15.6.7 Donor

- Drop things from ladder.
- Straddle from the ladder to a nearby foothold..
- Allow more than one person up a ladder at time.
- Use a ladder which is too short.
- Use a makeshift or 'home-made 'ladder.
- Over-reach (generally always keep hips within the stiles).
- Slide down ladder.
- No ladder should be used if it has: A missing, loose or defective rung or tread.
- A defective stile side member.
- A defective rope or associated fitting (rope operated extension ladders).
- Any sign of warping.
- Missing fastenings or rivets, guide or latching hooks.
- Always Return ladders to store as soon as they are finished with.
- Inspect a ladder immediately after any fall or overload.

15.6.8 Activities Allowed on Ladder

- A ladder is considered to be suitable for access of personnel to an elevated area only. No significant works may be carried out from a ladder. In particular, activities such as those below may not be carried out on ladder:
- Carrying tools (other than those which might clip onto a tool belt) up to an elevated level.
- Activities involving heavy manual labour.
- Activities requiring reaching or stretching such that the body is no longer centered over the ladder.
- For these types of jobs, a work platform such as a scaffold is required. The safe working position from a ladder is to have both thighs and hips within the styles.

15.6.9 Color code and inspection

- Color code of the year shall be painted on one style only and equal to one rung spacing.

15.2. Roof work

- All roof-work operations should be pre-planned and properly supervised.
- Roof work should only be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work.
- Work on roofs shouldn't be carried on in weather condition that threaten the safety of workers.
- Crawling boards, walkways and roof ladders should be securely fastened to a firm structure.
- Roofing brackets should fit the slope of the roof and be securely supported. Where it is necessary for a person to kneel or crouch near the edge of the roof, necessary precautions should be taken.
- On a large roof where work have to be carried out at or near the edge, a simple barrier consisting of crossed scaffold tubes supporting a tubing guardrail may be provided.
- All covers for openings in roofs should be of substantial construction and be secured imposition.
- Roofs with a pitch of more than 10 should be treated as sloping.
- When work is being carried out on sloping roofs, sufficient and suitable crawling boards or roof ladders should be provided and firmly secured imposition.
- During extensive work on the roof, strong barriers or guardrails and toe-boards should be provided to stop a person from falling off thereof.
- Where workers are required to work on or near roofs or other places covered with fragile material, through which they are liable to fall, they should be provided with suitable roof ladders or crawling boards strong enough and
- When spanning across the supports for the roof covering to support those workers.
- A minimum of two boards should be provided so that it is not necessary for a person to stand on a fragile roof to move a board or a ladder, or for any other reason.

15.3. Electrical Safety

- Only authorized electrical engineer / electricians are permitted to do the electrical work.

- Do not use extension cords or electric hand tools with exposed wires.
- To switch-off electrical supply in case of an emergency must be enabled at all times.
- All temporary electrical installations carried out on the site must be in accordance with the local regulations and specifications.
- The installations must be inspected regularly by a competent person (e.g. electrical engineer/supervisor) to ensure that they are in safe condition and working faultlessly.
- Each electrical power tools and electrical equipment must be under protection of earth leakage/residual current protective device(ELCB/RCCB).
- Portable power tools used on site must have protective insulation ("double insulation").
- All electrical machines, tools and appliances must be inspected by a competent person (e.g. electrician) to ensure that all equipment's are in safe condition and working faultlessly. To confirm that the inspection was conducted the equipment must be labeled or marked clearly and registered. The documentation must be submitted to TE for records.
- Assume that all circuits are live until they have been thoroughly checked and proven dead. Never work on a live circuit.
- When using electrical equipment in an environment with electrical conductivity (e.g. in confined spaces like case pipes, containers, towers) the voltage used may at maximum be 24 Volt AC. (fed from a safety low voltage transformer)
- Never use a fuse heavier than the capacity of the circuit. Also never attempt to bridge abuse.
- Never tamper with any electrical wiring or apparatus.
- Do the cable laying as per standard specifications and requirement; do not lay down power cables adjacent to secondary cables of welding machine.
- Assess overhead power line hazard and keep safe distance from it.
- All electrical equipment's, motors, transformers, welding machines, etc. to be provided with earth connections.

15.4. Power & Hand Tool Operation

- All portable tools are to be connected through control bus with ELCB.
- All contractors should ensure proper Earthling of all electrical equipment's used by

them. Suitable earthling pits must be made if required.

- Examine electric cable for defects before use.
- Do not ever insert free ends of wires into sockets and hold them in place with matchsticks / other means. Always use industrial three pin plugs.
- Check the RPM rating of grinding wheels. The RPM rating must be greater than or same to that of the driver. Wheel guard should be used in proper position before grinding. Also proper PPEs must be ensured (goggles &hand gloves).
- Do not tie electric cords to metal rods or nails.
- No cable should run under the ground. It must run overhead at a 2 m height to avoid pinch point and creating trip hazard
- AlltoolsandTacklesmustbeexamineddailybeforecommencingworkandrecordtobemaintain ed.
- Defective tools are to return to store.
- All electrical tools must be inspected at regular intervals by an authorized electrical person and record to be maintained.
- The weight, size & type of tool should be selected to suit the job carried out.
- The handles of tools should be intact and properly tightened. Split handles should be replaced. To avoid slippage, grease and oil should be wiped off.
- Insulated and non-conducting tools shall be tested for electrical resistance.
- Wrenches should not be pushed but pulled. Chisels struck by others should be held by tongs and not by hands.
- Chipping should always be done away from self.
- Hand tools should not be allowed to lie down on benches, scaffoldings etc. from where they can fall. They should be properly stored.

15.5. Welding

The metal frames and cases of mains-powered welding rectifiers, transformers and voltage regulators and of engine driven welding machines must be positively earthed locally throughout the work.

- Welding leads and return leads must be protected against physical damage.
- Insulated electrode holders and cable lugs / protectors must be used.
- The return lead must be attached to the work place as close as reasonably practicable to the welding point.
- If mains power is used, the work piece must be positively earthed using a well-

protected earth wire connected at both ends by bolted lugs or secure screw clamps.

- Bolted joints in pipelines and structures must not be relied upon to provide adequate electrical continuity for welding currents.
- Electric arc welding should not be carried out on equipment suspended from a crane because of the risk of damage to lifting wires from uncontrolled stray currents.
- Welders must not wear metal rings, bracelets or necklaces during the work as induced currents from the welding equipment might heat these.
- Dry, non-conductive gloves should be worn.
- The welder must always disconnect the electrode holder from the supply before attempting to replace an electrode.
- The welder should not lean against an earthed conductor whilst manipulating live electrodes.
- Welders working with electrodes fed from different phases of a three-phase supply should not work in close proximity to one another.
- Ensure that welding machine is in order and approved by site engineer.
- Ensure that welding cables are in order.
- Remove all combustible material from welding area to avoid fire.
- Place a fire extinguisher nearby welding premises.
- Ensure welding holder, cable and its lugs in good condition and use only industrial power socket and plugs (3 Pin) to avoid electricity risk.
- Make sure that welding machine is provided with ON/OFF switch and is earthed/grounding.
- Do not over load electrical appliances and cable, shocked pined.

15.6. Gas Cutting

- Gas cylinders must be secured in the vertical position to prevent them being knocked or pulled over.
- Long lengths of hose should be avoided, but;-
- Cylindersmustbekeptfarenoughawayfromtheweldingorcuttingoperationsto prevent contact with sparks, flames and metals platter.

- Cylinders must be placed where they are unlikely to be damaged by stray electric currents or falling objects.
- Cylinders must not be taken into confined spaces.
- The torch must always be lit from a lighter provided for the purpose. There should be no attempt to light it from hot metal.
- Check the cylinder and its valve or leakage and move out any leaking cylinder immediately.
- Ensure that flash back arresters are installed with torch and NRV (Non return valve) on the gas cylinders side.
- Ensure cylinder is far away from fall of sparks and hot metal.
- Check the regulator and torches that they are inspected prior to every use.
- Check for leaks around regulators, hoses/fittings & nozzle with soap solution.
- Check the entire hose length if it is cracked or worn out cut that length of hose or replace the hose.
- Check that flash back arrester used for the purpose is of approved make/specification only.
- Place a fire extinguisher nearby welding premises.

15.6.1. Gas Cylinders

The handling of gas cylinders must comply with local legislation and TE's regulations as per particulars given below:

- Gas cylinders must be stored protected from excessive heat, fire, dangerous corrosion, mechanical damage or access by unauthorized.
- Gas cylinders must not be stored together with flammable materials.
- Gas cylinders must be secured to prevent them from falling over.
- Gas cylinders must be capped and operated upright.
- Use cylinder trolley / cage for the transportation of gas cylinders at site.
- Never use oil or grease on the regulator of a cylinder valve.
- Store gas cylinders in ventilated area.
- Don’t keep LPG cylinder in confine/below ground area.
- Gas stores must not be set up in critical areas such as stairways, corridors,

emergency routes, garages or passages for person's or vehicles.

- Never transport by rolling them on the ground or use them as rollers or supports.
- Never attempt to repair cylinder.
- Leaking regulators, cylinder valves, hose pipes or other equipment should be taken out of service.

15.7. Grinding Operation

- Grinding wheels should be stored in dry place.
- After expiry date, grinding wheel must be condemned, broken in to pieces.
- Power supply cable of adequate current carrying capacity shall be used and it should be in good workable condition without abrasions, cuts or puncture in outer insulation.
- Socket pin provided at supply end and On/off switch in working condition.
- Proper earthling of the body in case of metallic body.
- Wheel guard properly fitted imposition.
- Machine body without any damage like cricket.
- Moving part (wheel) must be properly fixed to the machine with the help of spanner.
- Grinding wheel must be of suitable size as per the speed of grinding machine.
- Grinding wheel without manufacturer's stickers having size, speed and expiry date must be condemned.
- Don't use portable grinding machine as bench grinder.
- Don't fit over size wheel than recommended size by machine/wheel manufacturer.
- Don't grind small, unstable object without fixing it in the vice.
- Don't over press the grinding wheel against the job for fast removal of metal.
- Put OFF the main switch, while machine is not in use (tea breakneck.).
- Don't chip off grinding/cutting wheel for achieving fast cutting rate.

PPEs:

- Use of helmet, face shield or safety goggles (where face shield is not possible.) and hand gloves.