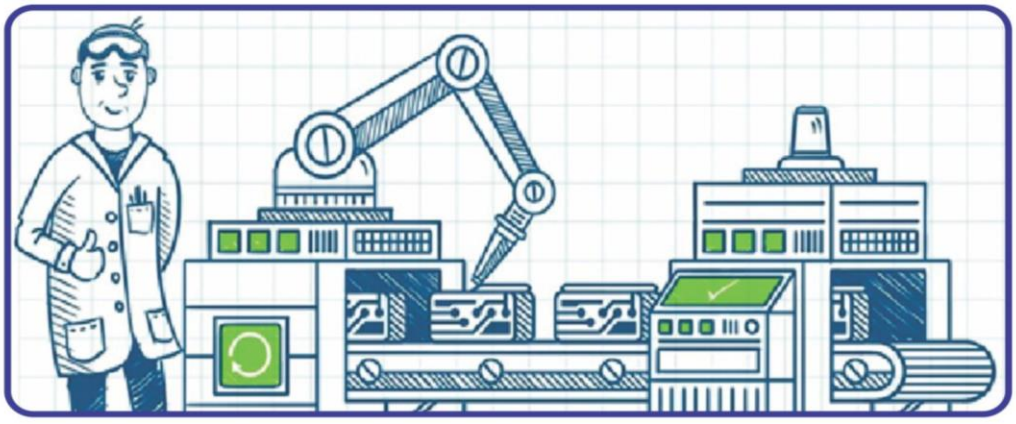


Safety Manual

For

DCSEM

Maintenance Personnel



SAFETY MANUAL

FOR

DCSEM

MAINTENANCE PERSONNEL

S. Basak
SO/H, Manager (Safety),
Training Division, DCSEM.

भरत कुमार जैन,
BHARAT KUMAR JAIN,
उत्कृष्ट वैज्ञानिक एवं
निदेशक
Outstanding Scientist &
Director



भारत सरकार
Government Of India,
परमाणु ऊर्जा विभाग
Department of Atomic Energy
निर्माण, सेवा एवं संपदा प्रबंध निदेशालय
Directorate of Construction,
Services & Estate Management,

FOREWORD

I am extremely happy to note that Training Division has made a Safety manual for DCSEM maintenance personnel.

Maintaining a safe environment in the workplace not only reduces the number of incidents / accidents but also increases productivity of the organization. Being a service organization, DCSEM always gives utmost importance to qualitative output as well as safety of its operation and maintenance personnel.

I am sure that this manual would be very useful for the maintenance personnel to update their knowledge on safety. Precautions need to be taken for day to day works, every day, every time and in every work.

I extend my best wishes for a safe & healthy environment in all maintenance activities of DCSEM.

I would like to thank Training Division and all concerned Section Heads for their effective and sincere efforts in compilation of this manual.

(B.K. Jain)
Director, DCSEM

विक्रम साराभाई भवन Vikram Sarabhai Bhavan, अणुशक्तिनगर, Anushaktinagar, मुंबई Mumbai - 400 094
दूरभाष /Telephone : (91-22) 2556 5102, फैक्स / Fax : (91-22) 2556 5362, ई-मेल / E-mail: director@dcsem.gov.in

Preamble

Maintenance is one of the most important activities in any organisation as it ensures smooth functioning of the equipment and services, eliminates / reduces waste and help to run the organisation efficiently. However maintenance work is highly prone to hazards and maintenance personnel therefore need to be aware of the hazards associated with each maintenance work and the safety precautions need to be taken for the same.

Major services of DCSEM involves maintenance activities. It was therefore felt necessary to have a safety manual for maintenance personnel of DCSEM, which will help them to understand the risks associated with maintenance work, safety rules to be followed and safety precautions need to be taken. This manual must be read in conjunction with "DCSEM Construction Safety Manual – 2019".

This manual need not be considered as only and ultimate requirement. Wherever and whenever it is felt necessary for requirement of specific procedure and methodology to achieve safe working condition, the same need to be followed.

Safety posters included in this document are from 36th DAE Safety & Occupational Health professional meet (DAE – SOHPM) 2019. Pictures for substation, battery room and welding operation are of DCSEM received from General Service Section (GSS).

Training Division thanks Competent Authorities of NFC and AERB, organizer of (DAE – SOHPM) 2019 and GSS of DCSEM for valuable inputs needed for this manual.

Training Division thanks Competent Authority of DCSEM for encouragement and valuable inputs for preparation of this document.

K.V. Rao
Head, Training Division,
DCSEM.

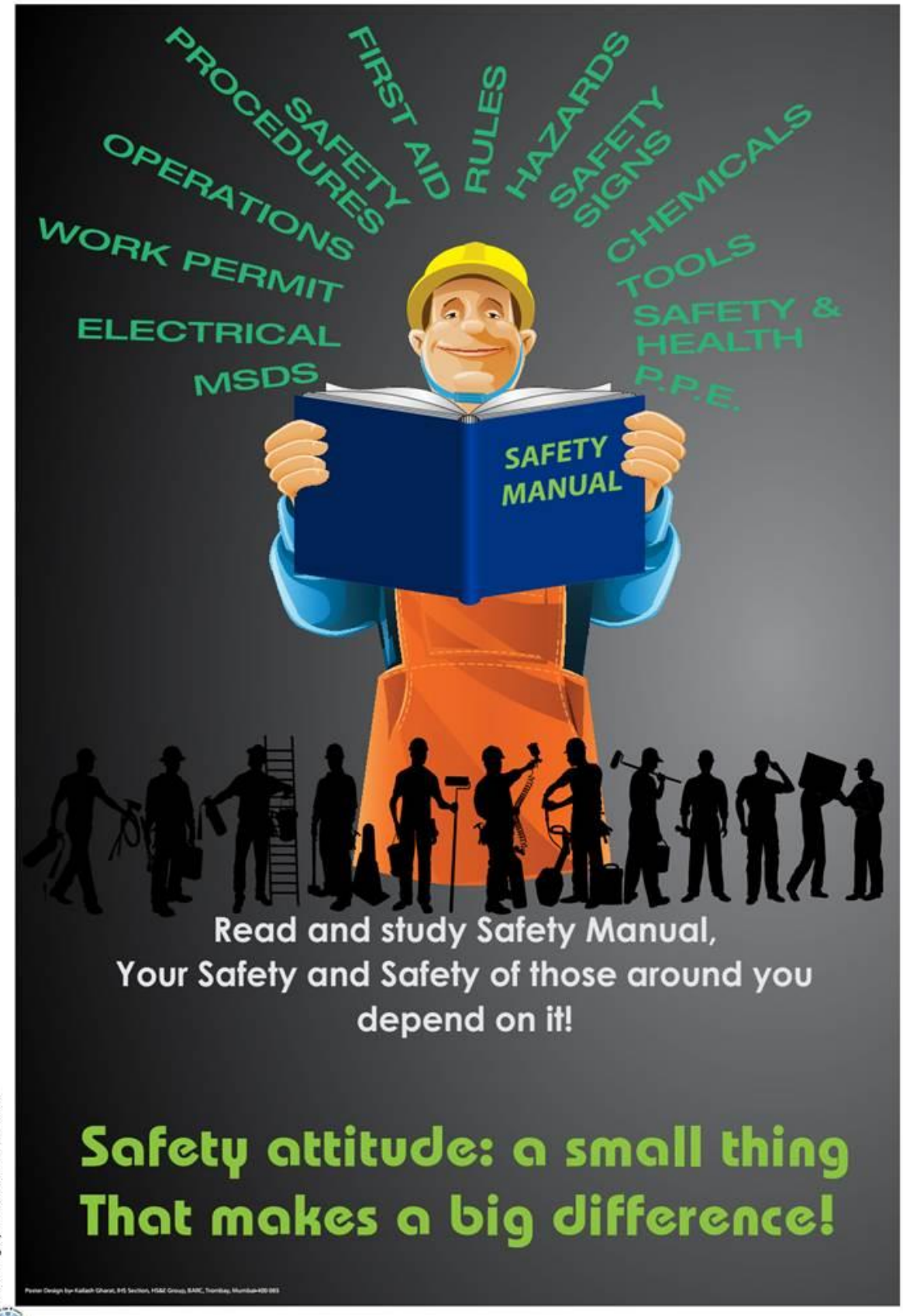

Always
give safe practice its due,
Remember
someone is waiting
for you
Industrial Hygiene & Safety Section
Health, Safety and Environment Group
Bhabha Atomic Research Centre
Slogan by: Smt. R. Vijayalakshmi, REDS, Safety Slogan Contest-2010, Organised by IHS Section, HSEG, BARC, Mumbai
Design by- Kailash Gharat, BARC

I N D E X

Sl. No.	Title	Page No.
1	Maintenance, Requirement of safety in maintenance	6
2	General Safety Rules	11
3	Safety for Electrical maintenance	19
4	Safety precautions for commonly used Electrical equipment	24
5	Electrical Safety Rules Do's and Don'ts	32
6	Safety precautions while working on Substations	38
7	Safety precautions while handling Batteries	41
8	Safety for Mechanical maintenance	44
9	Safety precautions for commonly used Mechanical equipment	45
10	Safety precautions in welding operations	50
11	Safety precautions for Plumbing work	54
12	Hand Tool Safety	58
13	Ladder Safety Step Ladder	66
14	Fire Safety	70
15	First Aid	74
16	Personal Protective Equipment	77
17	Comments & Suggestions	82

MAINTENANCE,

REQUIREMENT OF SAFETY IN MAINTENANCE



Poster Design by: Kailash Gharat, HSS,HSEG,BARC

Industrial Hygiene & Safety Section, HS&EG, BARC

Maintenance

Maintenance means activities required or undertaken to conserve as nearly, and as long as possible, the original condition of an asset or resource while compensating for normal wear and tear.

Importance of Maintenance

Maintenance of equipment, plant and buildings includes technical, administrative and managerial actions intended to keep it in, or restore it to, a state in which it can perform the required function for which it was intended, protecting it from failure or decline. Maintenance activities include;

- Inspection
- Testing
- Measurement
- Replacement
- Adjustment
- Repair
- Fault detection
- Replacement of parts
- Servicing

Regular maintenance is necessary to keep equipment machines and the work environment safe and reliable. Lack of maintenance can lead to dangerous situations, accidents and health problems.

Maintenance often involves unusual work, non-routine tasks and it is often performed in exceptional conditions such as working in confined spaces.

Safety

Safety is the state of being safe; freedom from the occurrence or risk of injury, danger or loss.

Requirement of safety in maintenance

Maintenance is a high risk activity with specific hazards and risks which include working alongside of running process and in close contact with machinery. In addition to above, maintenance often involves unusual work

and non-routine tasks which are performed in exceptional conditions and therefore enhances risk of human error and occurrences of accidents.

But while maintenance activities can put workers at risk, not carrying out maintenance may put even more workers at risk, as people will have to work with dangerous equipment. A planned maintenance programme is therefore part of a good safety culture, but must be done safely.

Risk

Risk is uncertainty of outcome or undesirable consequences.

Various risks in maintenance

Maintenance work is varied and the types of hazards that can be created are also unique and therefore the individual risks always have to be assessed and controlled. The problems that workers are likely to face are the following:

Access - Both access to and around the building as well as access to the equipment that needs maintained can be a problem. Some maintenance activities will involve working in confined places where access can be a problem.

Work at height - A lot of maintenance work has to be done above ground level, such as windows or on roofs, often in very risky locations that were not designed to have someone working there.

Chemical and dust exposure - Often maintenance workers are exposed to chemicals that are toxic either because they are used in the process that is being maintained or because they are used to clean or maintain the equipment. This is not only an issue in factories but also in offices and schools where maintenance workers often use chemicals to repair or clean office equipment. In addition many maintenance workers are exposed to dust. Maintenance workers have higher rates of skin and breathing problems.

Asbestos - This is present in over a million workplaces and often it is un-marked. Many employers do not know it is there or do not tell any contractors working on the premises. Maintenance workers, especially

plumbers, fitters and carpenters are at greatly increased risk of asbestos related diseases.

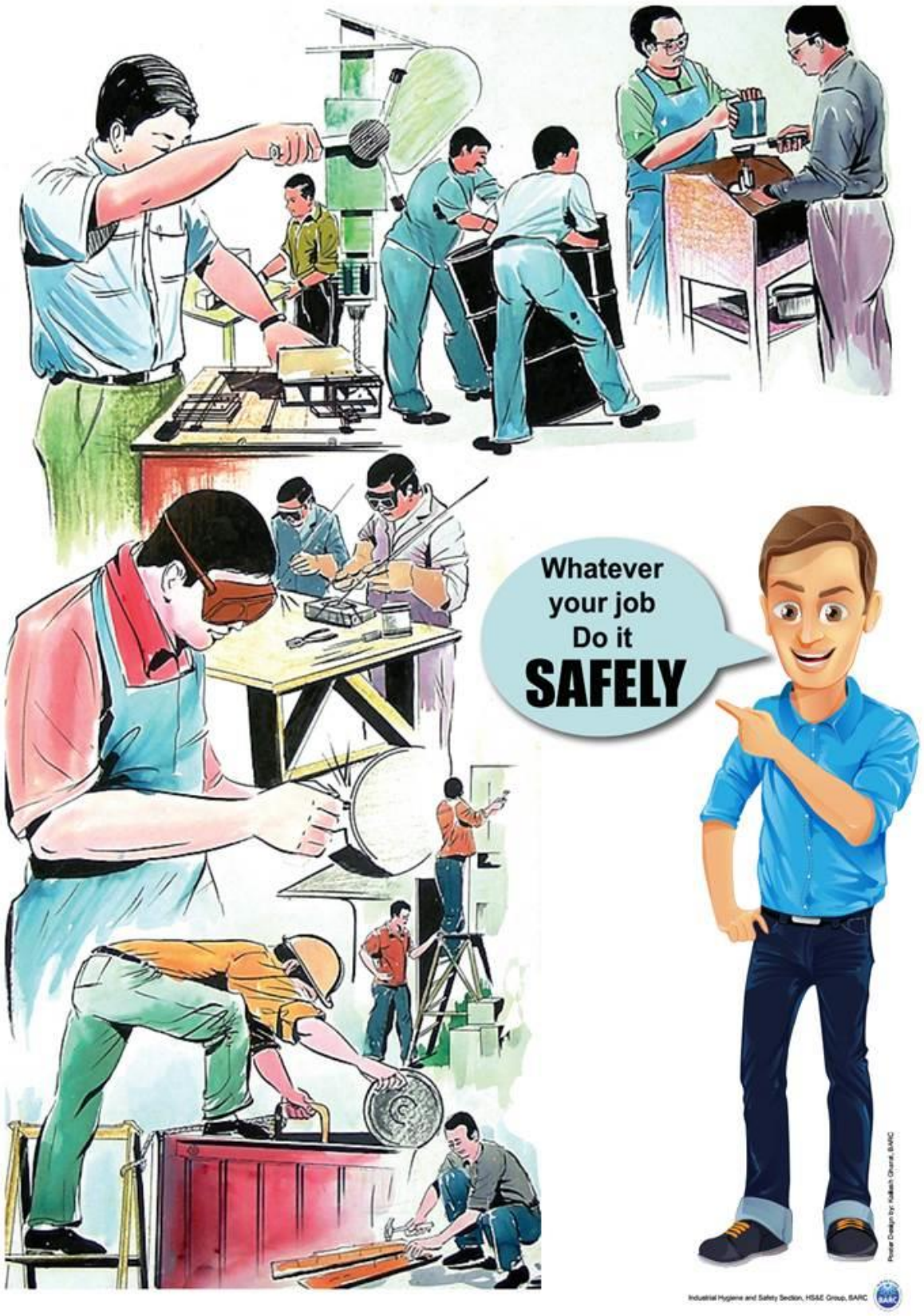
Equipment and machinery - If equipment has not been fully disconnected and isolated there will always be a risk it could be turned on by mistake. There is therefore the risk both of moving parts and also electrocution.

Musculoskeletal problems - A lot of maintenance work can involve bending or repetitive work, often with a lot of force. In addition it may have to be carried out in a cramped space. This increases the likelihood of musculoskeletal problems.

Biological hazards - Some maintenance work, including plumbing and air conditioning maintenance puts the person at risk of contact with legionella. Maintenance workers are also at increased danger from a range of other diseases including tetanus and some lung disorders.

Noise - some maintenance work has to be carried out close to noisy equipment, or can involve a lot of drilling or hammering. Hearing loss can be an issue.

GENERAL SAFETY RULES


Whatever
your job
Do it
SAFELY
Industrial Hygiene and Safety Section, HS&E Group, BARC

General Safety rules

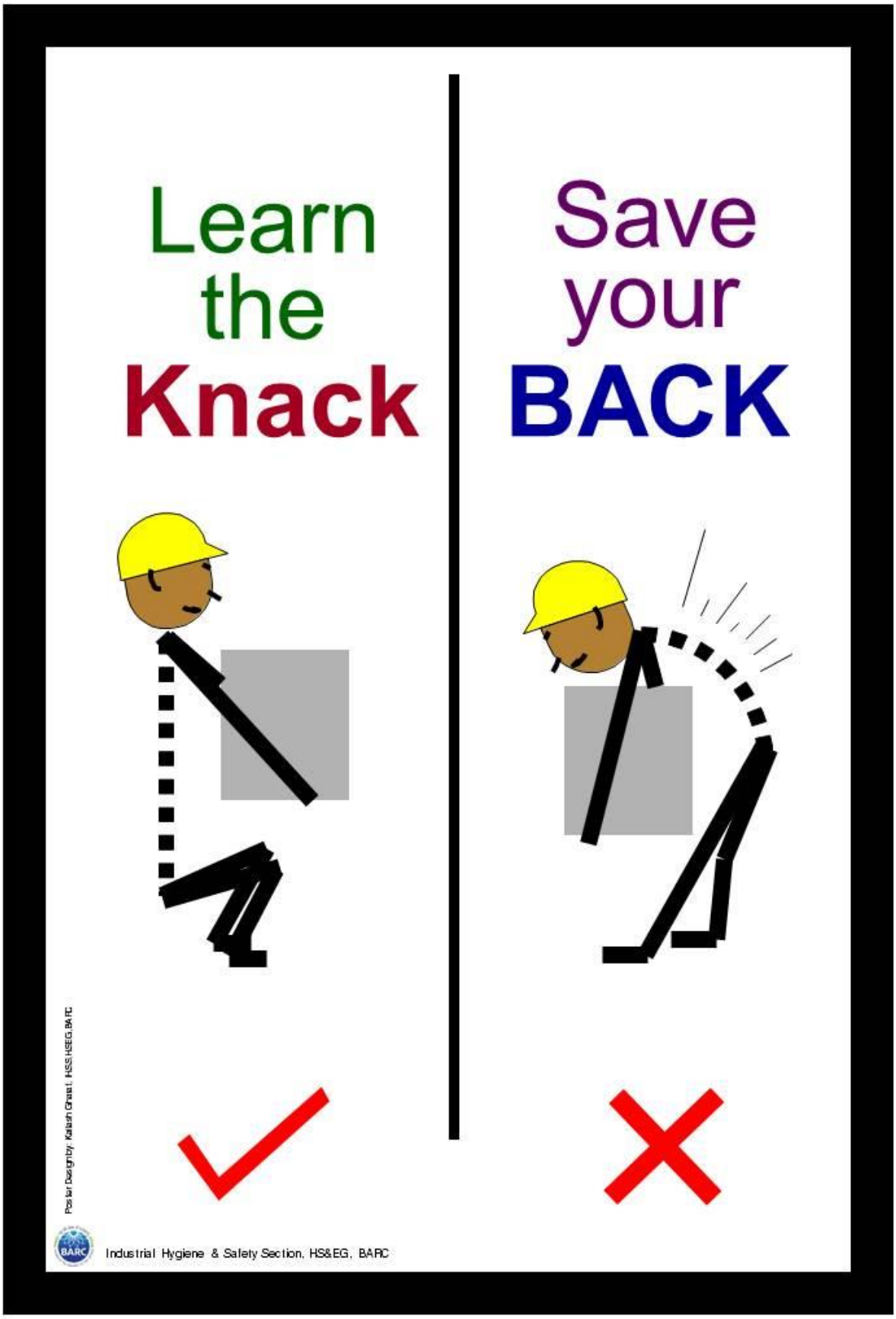
The following are some important general safety rules that each employee is required to follow, regardless of work assignments.

i) **Lifting load -** Lifting improperly is a major factor of the tremendous number of claims for back injuries. The following procedures should be followed:

- Size up the load; make sure it is stable and balanced. Test the weight you can lift it yourself.
- Plan the job. Ensure that your path of travel is clear and that you have identified the location where you will place the load.
- Establish a good base of support. Use a wide balanced stance with one foot ahead of the other.
- Bend your knees and get close to the object as possible. Lift with your legs and not your back.
- Get a good grip on the object to be lifted. Make sure you can maintain your hold throughout the lift and won't have to adjust your hands later.
- Lift gradually, don't jerk, but use a slow steady movement.
- Keep the load close while carrying; this prevents you from arching your backend adding additional stress to your back.
- Pivot; don't twist when you need to change directions. Move your feet in the direction of the lift. Twisting is especially harmful for your back.
- If the load is too heavy, either enlist another helper or use a mechanical device.

ii) **Good housekeeping -** Good housekeeping is an aid to safety. All employees shall keep tools, equipment and work area clean and orderly.

iii) **Stairways and exits -** Keep aisles, stairways and exits clear of boxes and other tripping hazards. Do not obstruct exits.


Learn the Knack
Save your BACK
Poster Designby: Kailash Ghatal, HSS,HSEG,BARC
Industrial Hygiene & Safety Section, HS&EG, BARC

iv) **Clean spills -** Clean spills immediately. Mark the spill if you must leave to retrieve assistance or additional supplies.

v) **Location of fire extinguishers –**Each employee should know the location of fire extinguishers in their work area. The area in front of fire extinguisher should be kept clear for ready access. Employees should not fight fires that are beyond their fire training and limitations of available firefighting equipment. When in doubt call professional help and evacuate to a safe area.

vi) **Cleaning fluid** – Gasoline should not be used as a washing or cleaning fluid. When cleaning solvent is required, use an approved cleaning solvent.

vii) **Storage of material** - Material should be stored in a safe and orderly fashion. Flammable liquids should be stored in an approved Flammable Storage Cabinet.

viii) **Use of ladder -** Use a step ladder or a step stool for reaching above shoulder height. Never stand on the cap (top two steps) of a ladder.

ix) **Operation of machinery** - Do not operate machinery that you are not familiar with and have not been trained to use.

x) **Inspection of Tools** - Inspect all tools and equipment prior to use to ensure they are in working order and do not present a hazard.

xi) **Placement of tools** -Put all tools or equipment back in their proper place.

xii) **Disconnection of cords** -Disconnect all electrical cords by grasping the plug and carefully disengaging; never yank by the cord. If an electrical cord is frayed or wires are exposed, remove it from service.

xiii) **Hand rails**-Use handrails when using the stairways. Never take more than one stair at a time.


PREVENT
A FALL !
Wipe it up!
CLEAN UP
DON`T SLIP UP
Poster Designby: Kailash Ghatal, HSS:HSEG,BARC
Industrial Hygiene & Safety Section, HS&EG, BARC

xiv) **Qualified employees** – Only qualified designated employees should work on electric wiring and equipment.

xv) **Reporting of broken too**l- Report all unsafe or broken tool s and equipment to your supervisor.

xvi) **Warning sign**- Observe all signs, safety bulletins and posters.

xvii) **Reporting of accidents** - Report all accidents to your supervisor.


SAFETY WORKS GREAT
WHEN YOU PARTICIPATE !
CORRECT WAY
INCORRECT WAY
Do not stagger clips
INCORRECT WAY
HOW TO ATTACH
WIRE ROPE CLIPS
Keep your mind on the job !
Poster Design by: Kailash Ghaisas, HS&EG, BARC
Industrial Hygiene & Safety Section, HS&EG, BARC

SAFETY
FOR
ELECTRICAL MAINTENANCE

ELECTRICAL EQUIPMENT

GENERAL

i) **Inspection of electrical equipment** - Electrical equipment, leads, and wiring should be inspected regularly for compliance with the National Electrical Code Standards, especially in wet areas or any area where proper grounding and ground fault circuit protection is needed.

ii) **Grounding of machines -** Office machines should be grounded if they are equipped with a ground wire or three-prong plug. New equipment should have grounded connections.

iii) **Electrical cords and plugs** -Electrical cords and plugs should be in safe repair. Check for loose plugs, worn insulation, and defective outlets. Any frayed cords or those exposing wiring should be removed from service.

iv) **Adapter –** If an adapter must be used to insert a grounded plug into an ungrounded receptacle, attach the pigtail to a grounded object.

v) **Electrical extension cords–**Electrical extension cords should be 3-wire grounded type. They should be arranged so as not to cross walkways. Extension cords should not be used as a permanent wiring solution but only a temporary measure.

vi) **Wall outlets** – Wall outlets should not be overloaded by connecting additional appliances, with adapter or extension cords.

vii) **Qualified personnel for electrical repair**–Only licensed electricians or qualified personnel should attempt any electrical repair.

viii) **"Lock Out" of equipment before repairing –** Ensure "Lock Out" of all equipment before repairing cleaning, adjusting.

Safety precautions for indoor installations.

i) Do not put on the switches with wet hands especially during monsoon season.

ii) Repair any appliances immediately that sparks, emit smokes or shocks you.

iii) Frayed wires should be replaced at once.

iv) Keep work areas clean

v) Use fuses of appropriate ratings.

vi) Always switch off the main switch before replacing a blown fuse. Always maintain the earth connection in a satisfactory condition

vii) Be aware of live wires or conductors

viii) Never disconnect a plug point by pulling the flexible wire.

Safety precautions for Outdoor installations.

i) Never use electric power tools or appliances in the rain or while standing in water.

ii) Do not climb utility poles or transmission towers when they are charged.

iii) Before digging learn the location of underground power lines.

iv) The stored energy in the capacitance of HV motors, transformers, U/G cables and bus bars gets discharged while switching off for repair if these are not properly earthed.

v) Never attempt to remove a person from energized circuit with your bare hands.

vi) Always wear a safety belt before starting work above ground level or on a pole.

vii) In case of fire, disconnect the supply immediately. Do not throw water on equipment.

viii) Rubber mats should be placed in front of electric panels or switchboards.

ix) Always use electric rubber gloves while working above 650 volts. Always seek permission to the work, while servicing live switchgear.

SAFETY PRECAUTIONS FOR COMMONLY USED ELECTRICAL EQUIPMENT

1. ELECTRICAL HAND DRILLS



I) **Use of Sharp straight bits -** Use only sharp, straight bits of the size intended for the machine.

II) **Wear eye shield**–Keep eyes away from electrical hand tool cooling air vents; wear an eye shield or goggles to keep dust from being blown into eyes. Do not operate machinery that you are not familiar with and have not been trained to use.

III) **Take care of your clothing** -Severe injury may result if a live bit gets hold of a piece of clothing.

IV) **Hold properly**- Do not try to hold small pieces of material with the fingers.

V) **Use screwdriver attachment**- Always use the screwdriver attachment in such a way that it cannot injure the operator if it slips off the work.

2. ELECTRICAL POWER CORDS



I) **Use of proper cords** -Worn cords can cause short circuits, shocks, and fires. Do not use electrical tools or extension cords that are defective. Always be sure you are using the right type of cord for the right job. Use heavy duty cords for tools, moisture resistant cords for outdoors and in areas that could be wet and always use the 3-wire type of cords with Ground Fault Circuit Interrupters (GFCI).

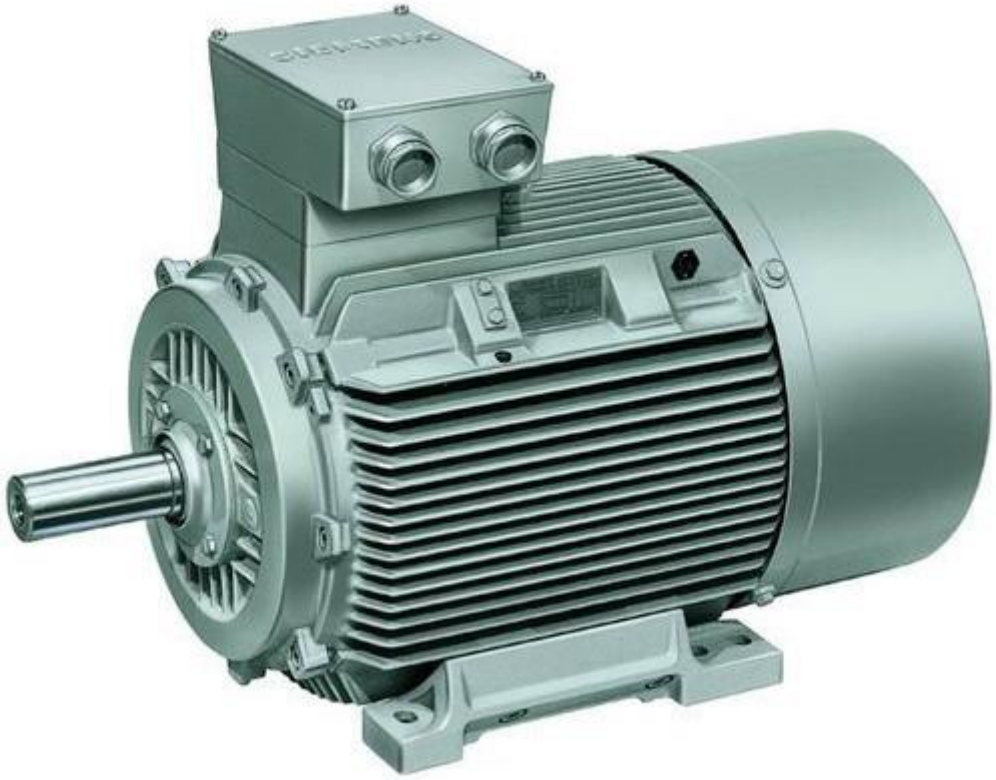
II) **Connection of surge protecto**r - Never connect multiple surge protectors together.

III) **Extension cords**- Never use extension cords that are defective. Extension cords must never be affixed to a wall with metal staples. Extension cords should never be run through walls, ceilings, or floors.

IV) **Protection of cords from heat and water**- Never wrap cords around steam pipes, metal, or warm appliances. Protect them from heat and water. Never place cords under rugs or across a driveway because damage can occur to the insulation

V) **Disconnection**- Pull the plug and not the cord to disconnect from a wall outlet and check the cord often for wear at the plugs and connections.

3. Electric Motor



I) **Work area preparation –** Ensure proper workspace and keep work area clean and well lit.

II) **Use PPE**– Use proper personal protective equipment.

III) **Proper voltage** –Avoid electric shock by using the right voltage level. Do not exceed recommended volts as it can cause injury as well as cause the parts to overheat and start a fire,

IV) **Be careful** – If you need to stop working and return to the project later, take proper precautions. Never leave the motor unattended. Finish your repair, put everything away or secure the location to prevent injury, fire or other hazards.

V) **Heat warning**- Remember that electric current generates heat. Avoid touching heated parts. Heated electrical parts can cause severe burns. Handle parts carefully and consider wear work gloves.

4. Fan



I) **Be careful-** Never plug fan into an extension cord.

II) **Use PPE**– Use proper personal protective equipment.

III) **Work area preparation** Ensure proper workspace and keep work area clean and well lit.

IV) **Inspection**- Periodically inspect cords for damage, broken plugs safety wire and loose connections and replace damaged equipment before use.

.

4. Transformer



i) **Ensure Power off –** Keep the power off when working on transformer. Make sure that there is zero electrical leakage or continuity between current source and the system.

ii) **Ensure protection –** Use protective equipment specifically rated for the transformer's voltage output. Keep over current protection of conductors and circuits and set to manufacturer's standards.

iii) **Spare parts –** Keep spare nuts, bolts and other objects away from your work. Make sure that they don't fall onto or into the transformer.

iv) **Ensure proper grounding-** Always ensure that transformer is properly grounded.

v) **Ensure transformer dry-** Ensure transformer and all its components dry and free from any kind of moisture or water.

vi) **Monitoring-** Before installation, monitor transformer by checking for any burnt odour damaged power cords and connectors or other parts.


RIGHT KEYS
SAFE PRACTICES
SAFE EQUIPMENT
SAFE ATTITUDE
SAFETY
Poster Design by: Kailash Ghaisas, HSS,HSEG,BARC
Industrial Hygiene & Safety Section, HS&EG, BARC

ELECTRICAL SAFETY RULES
DO'S AND DON'TS

Electrical safety Rules "Do's"

- Do obey safety instructions given by the person in charge.
- Preach and practice safety at all the time.
- Do ensure that all portable electrical appliances are provided with 3 pin plug and socket connections and that metal work of the apparatus is effectively earthed.
- Do treat circuit as live until the same has been proved to be dead.
- Do work deliberately and carefully without haste. Be sure of what you are doing.
- Do eliminate short cuts while on duty.
- Do place safety tagging /warning boards on main switches before commencing work
- Do test rubber gloves periodically and place rubber mats in front of electrical switch board.
- Do thoroughly discharge to earth all cables before working on cores.
- Do insulate yourself from earth by standing on rubber mat while attempting to get the person who is in contact with live line or apparatus.
- Do take extreme care when breaking an inductive circuit as dangerously high voltage may result
- Do ensure controlling switches are opened and locked or fuse holders are withdrawn before working on lines.
- Do use correct size and quality of fuse wire while renewing the blown out fuse.
- Do ensure that all splices and connections are securely made.
- Do disconnect the supply immediately in case of fire on or near electrical appliance.
- Do keep away inflammables from electrical apparatus.
- Do break the circuit by opening the power switch and release the victim.
- Do remove the casualty from the cause, render first aid and send for doctor or take the casualty to the nearest hospital.
- Do report all accidents whether minor or major, fatal or non-fatal, immediately to the person in charge.

Electrical safety Rules “Don’ts”

- Do not work on live circuit without the specific orders of the supervisors and make certain that all safety precautions have been taken.
- Do not disconnect earthling connection or render ineffective the safety gadgets installed on mains and apparatus.
- Do not touch an electric circuit when your hands are wet, bleeding from a cut or have an abrasion.
- Do not touch the circuit with bare fingers or hand or other makeshift devices to determine whether it is live or not.
- Do not work on energized circuit without taking extra precautions, such as use of rubber gloves or other required PPE (Personal Protective Equipment).
- Do not remove Safety tags or other signs or interface with safety barriers to go beyond them.
- Do not renew a blown fuse until you are satisfied as to the cause and you have rectified the irregularity.
- Do not disconnect a plug by pulling flexible cable when the switch is on.
- Do not connect multiple plugs to single socket.
- Do not use wire with poor insulation.
- Do not close any Switch/Breaker unless you are familiar with the circuit, which it controls and know the reason for its being kept open.
- Do not tamper with cut outs unless authorised.
- Do not open or close switch or fuse slowly or hesitantly. Do it quickly and positively.
- Do not expose your eyes to an electric arc.
- Do not use fire extinguishers on electrical equipment unless it is clearly marked for that purpose.
- Do not throw water on live electrical equipment in case of fire.
- Do not use metal case flash light around apparatus which is energized.
- Do not wear loose clothing, metal watch straps, bangles or finger rings while working on appliances.
- Do not attempt to disengage a person in contact with a live apparatus, which you cannot switch off immediately.
- Do not touch his body, push him with a piece of dry wood.
- Do not discontinue artificial respiration until recovery or death is confirmed by doctor.
- Do not allow visitors and unauthorized persons to touch or handle electrical apparatus.



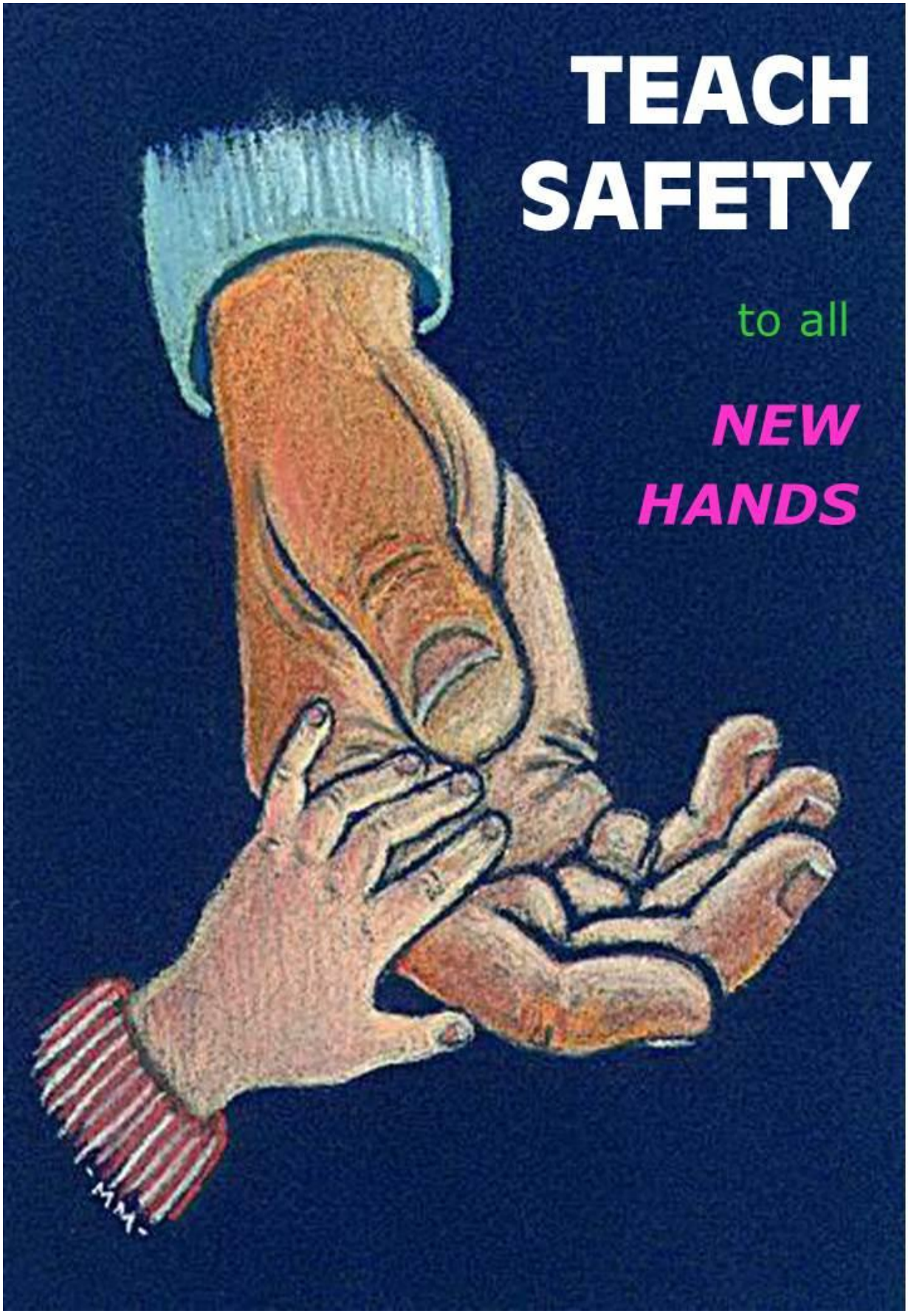
Overheated circuits

A circuit should not be made to take more current than it is meant to take.
The resulting heat can melt the insulation.
Too many plugs or adapters connected to one socket can also generate heat.

Industrial Hygiene & Safety Section
Health, Safety and Environment Group
BARC, Trombay, Mumbai

- Do not use metal case flash light around apparatus which is energized.
- Do not hang clothes and such other things on electrical fittings.
- Do not wear loose clothing, metal watch straps, bangles or finger ring while working on appliances.
- Do not work on pole or any elevated position if there is a live part on it, without the safety belt, rubber gloves and other necessary PPE and unless the authorized person stand on the ground nearby to direct operation and give warning.

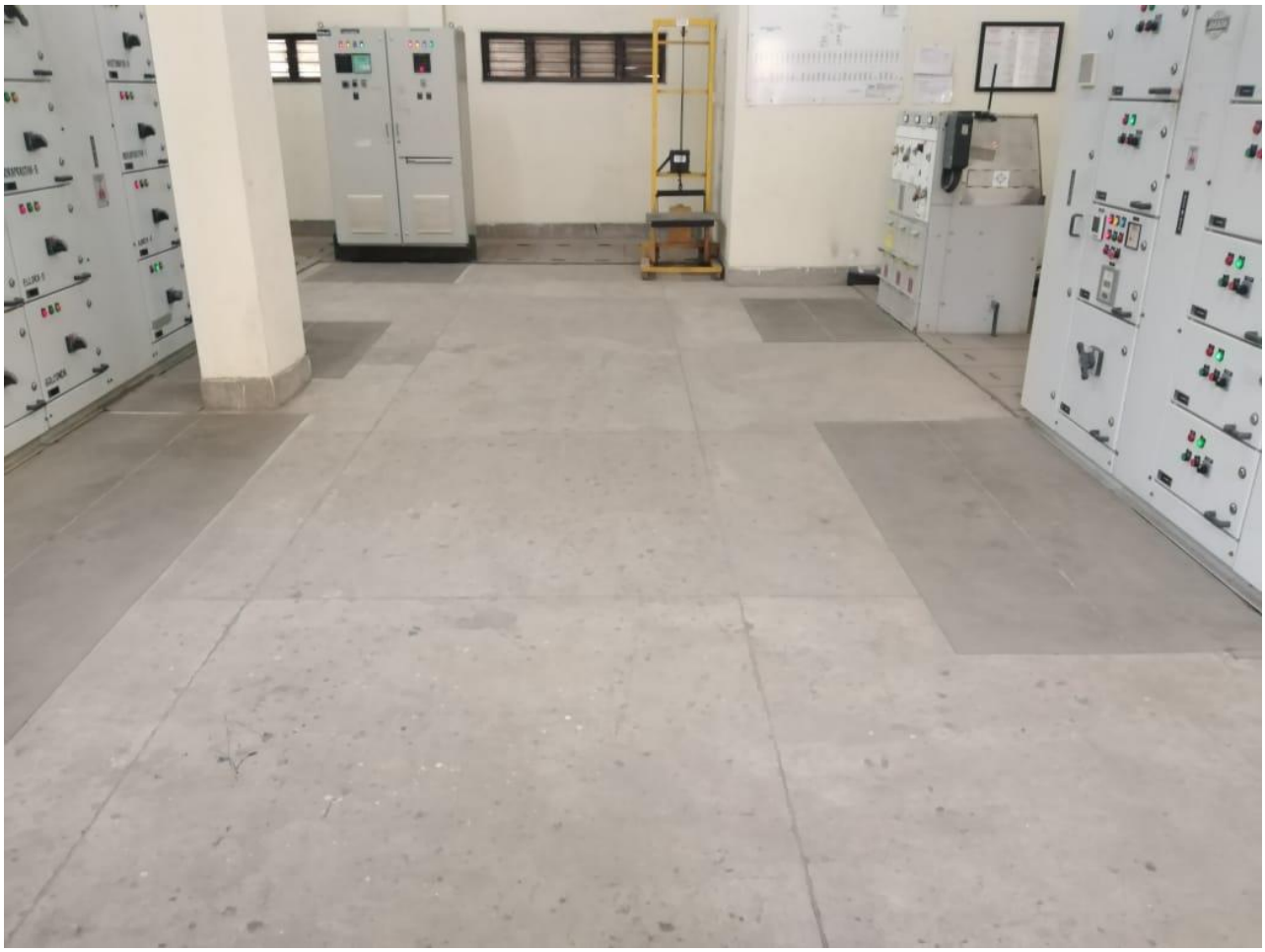



TEACH
SAFETY
to all
NEW
HANDS

SAFETY PRECAUTIONS WHILE WORKING ON SUBSTATIONS

Substation

- Know how each equipment functions, what parts are energised and what voltage, clearance requirements, risk involved and levels of protection are required to work on the equipment.
- Use proper PPE while working on substation.
- Use suitable protective clothing and equipment as warranted by the severity of the risk involved in each task.
- Be cautious even when around de-energised equipment.
- Maintain the prescribed clearance from each type of equipment and handle operations remotely if the option is available.
- Conduct routine inspections to ensure that the area and equipment are safe prior to each task.
- Ensure battery storage rooms are accessible for authorised personnel only.
- Avoid equipment storage in substation to prevent undue accident.
- Initiate for installation of security equipment (such as cameras and motion sensors etc.) at strategic locations, if not already installed to track the movement of personnel and equipment to ensure safe operation and maintenance.



SUBSTATION (DCSEM)

SAFETY PRECAUTIONS WHILE HANDLING BATTERIES

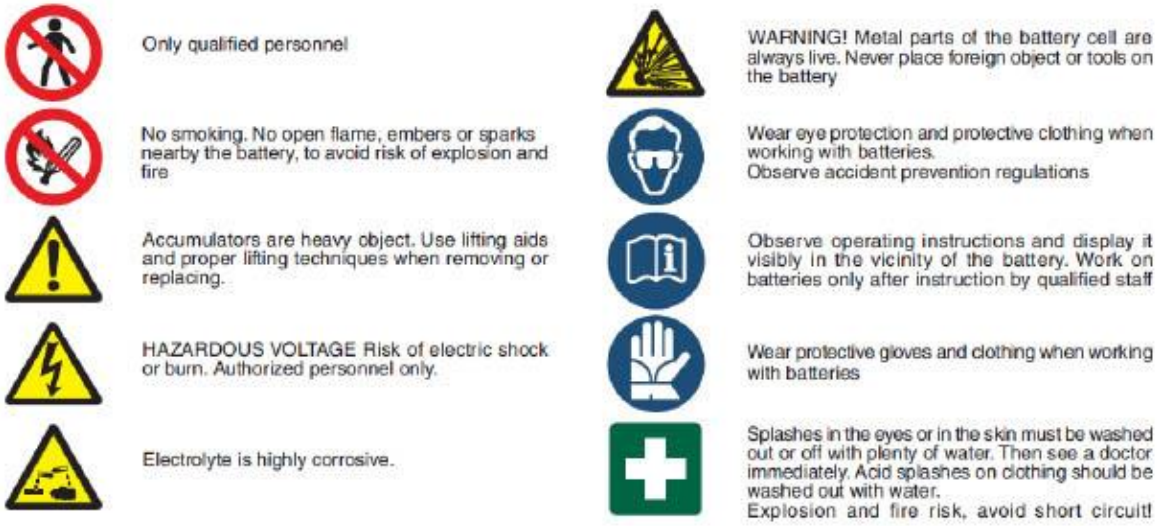


Battery Room (DCSEM)

Safety precautions while handling batteries

- Wear protective equipment when handling batteries including gloves eye wear and hard hat.
- Avoid bringing metal into contact with batteries. This include metal tools and personnel items such as jewellery.
- Never allow both terminals to make contact with an item (particularly yourself) simultaneously.
- Be aware of the appropriate battery handling and lifting procedure.
- Practice safe and appropriate lifting procedures.
- Be familiar with safety signage provided for safety in battery room.





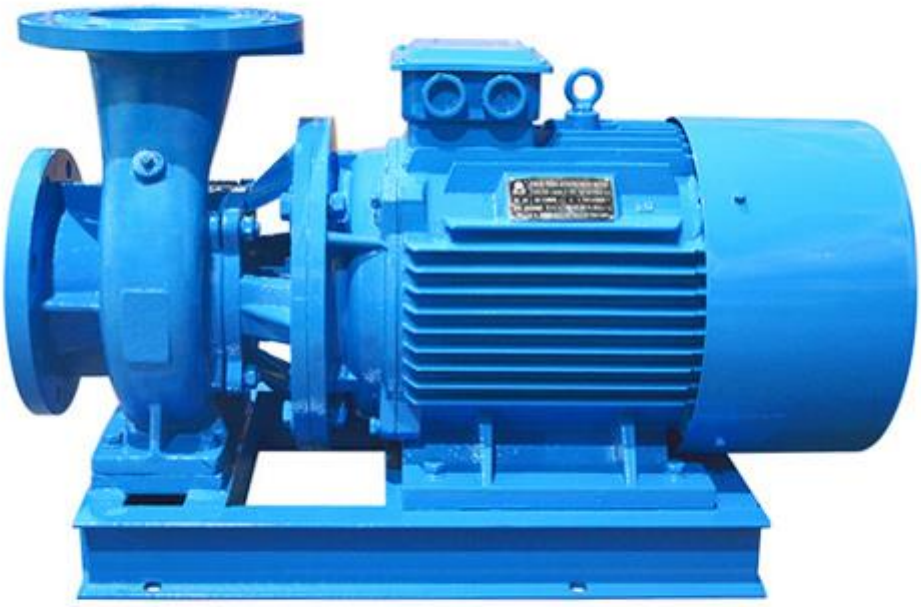
Typical Safety Signage for Battery Room

SAFETY
FOR
MECHANICAL MAINTENANCE

SAFETY PRECAUTIONS FOR COMMONLY USED MECHANICAL EQUIPMENT

MECHANICAL EQUIPMENT

1. Pump



i) **Lock out power to driver motor –** Always lock out power to the driver before performing pump maintenance.

ii) **Follow Manufacturer's procedure –** Follow manufacturer's procedure for dismantling of pump, installation of pump components, shaft alignment, assembling of pump and lubrication.

iii) **Piping** - Never draw piping into place by forcing at the flanged connections of the pump.

iv) **Disassemble** – Never use heat to disassemble pump**.**

v) **Safety apparel –** Use insulated work gloves, heavy work gloves, safety glasses, steel toed shoes and other personal protective equipment as required for the maintenance work.

vi) **Lifting of pump-** Lift pump only at specifically lifting points as assembled pumping units and their components are heavy and failure to properly lift and support equipment can result in serious physical injury and/or equipment damage.

vii) **Use of proper size and material-** Use only components of the proper size and material or as specified by pump manufacturers

viii) **Use of proper tools -** Use only tools that are in first-class condition. Examine the tools periodically to make sure they are in good working order.

ix) **Allow pump components to cool -** Allow pump components to cool before performing pump maintenance.

2. Window AC



i) Do not plug air conditioner into an extension cord or power strip.

ii) Ensure that window AC should have its own dedicated outlet.

iii) Never fix window units near water or where water is likely to be spilled.

iv) Follow manufacturer's instructions carefully when installing the window unit.

v) Never put anything on top of window AC such as flower pots or bird feeders etc.


In Emergency before you do, Think it through
DO IT ONCE
DO IT RIGHT
•PLAN
•PREPARE
•PROCEED

SAFETY PRECAUTIONS IN WELDING OPERATIONS

Safety Precautions in Welding operations

- Welding should be performed by qualified welders only.
- Flammable and other materials should be cleaned from surfaces before welding.

- Proper eye protection shall be worn by all personnel in the welding area.

- Gas cylinders require careful handling. Cylinders should be stored under cover, protected from the direct rays of the sun, sparks, flame, and heat. They shall be secured in an upright position with caps in place when stored or not in use. Caps shall be in place before cylinders are moved.

- Wear proper welding helmet with the proper shade of lens.

- Wear clean, fire-resistant gloves, clothes with a collar, and sleeves buttoned.
- Protect others in the vicinity by using screens, shields, or booths.

- Contact lenses should not be worn. Arcs generated by an arc welder may cause blindness.

- Never weld containers (drums, cans, etc.) which have held a flammable substance until they have been thoroughly cleaned, made vapour free, and tested for presence of flammable vapours.

- Move all combustible and flammable materials away before welding. Keep fire extinguishers handy.

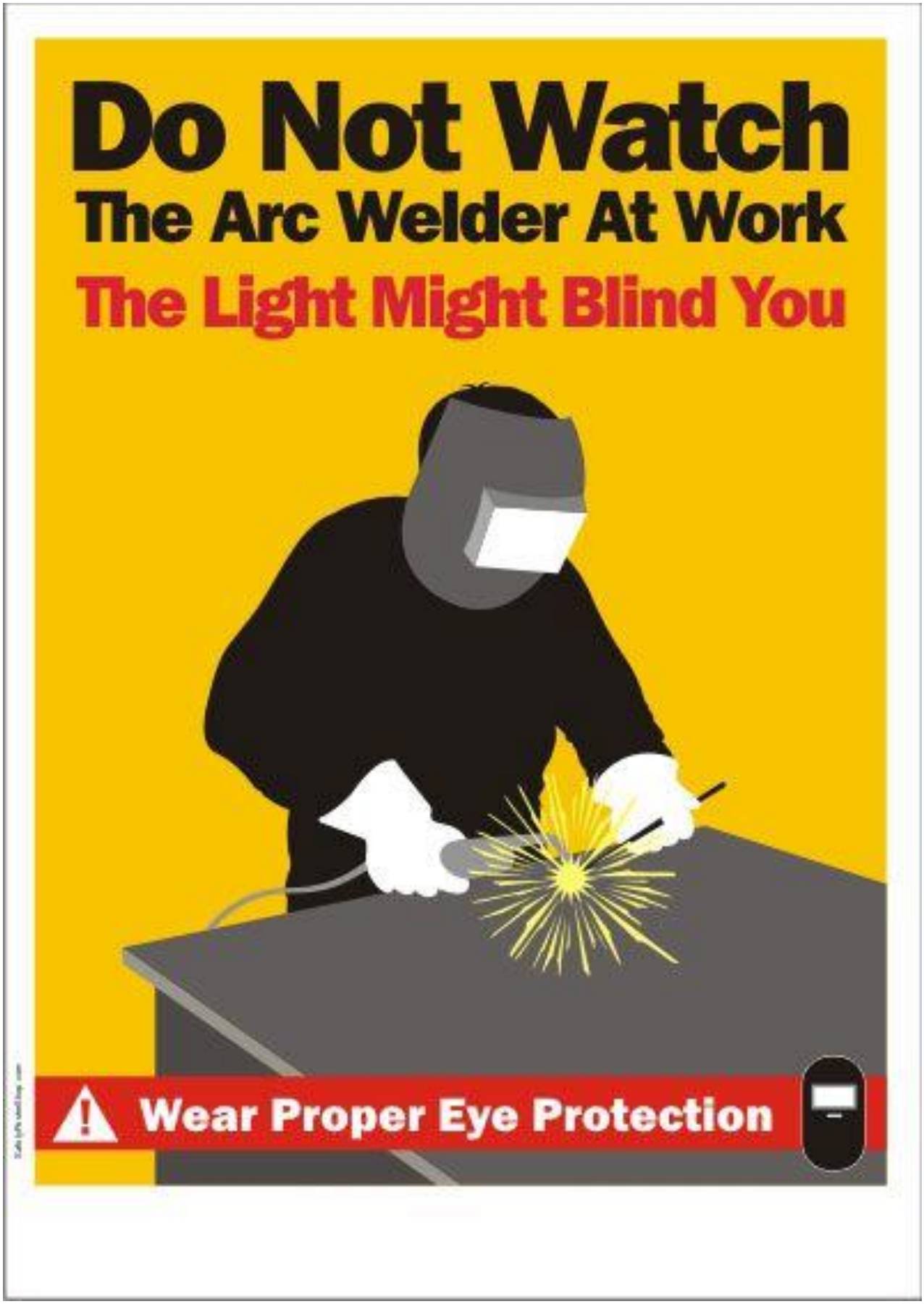
- Hoses shall be in good condition without leak or damage.

- Use correct hose connectors and hose clamp.

- All welding should be performed to procedures which have been reviewed by a qualified supervisor.



Welding operations being carried out for pipe jointing (DCSEM)


Do Not Watch
The Arc Welder At Work
The Light Might Blind You
Wear Proper Eye Protection

SAFETY PRECAUTIONS FOR PLUMBING WORK

Safety Precautions for plumbing work



- Wear eye protection of an approved type when any type of eye hazard exists.

- Wear hard hats in areas where tools, materials, or objects may fall from above.

- Wear safety belts and life lines when it is necessary to work at elevations where scaffolding or staging is not practical

- Wear gloves when it is required to handle pipe, sheet metal, or other material having rough edges.

- Wear adequate clothing, which includes long sleeves, and keep the cuffs buttoned when welding, cutting, or working on chemical or steam lines.

- Keep attention at all times of the safety of your fellow workers and the general public.

- Ensure that all electricity-driven power tools and machinery are be properly grounded with a GFCI/ELCB.

- Take care while handling pipes, ducts, or other materials, to avoid catching fingers and hands between the materials and the floor, or other objects.

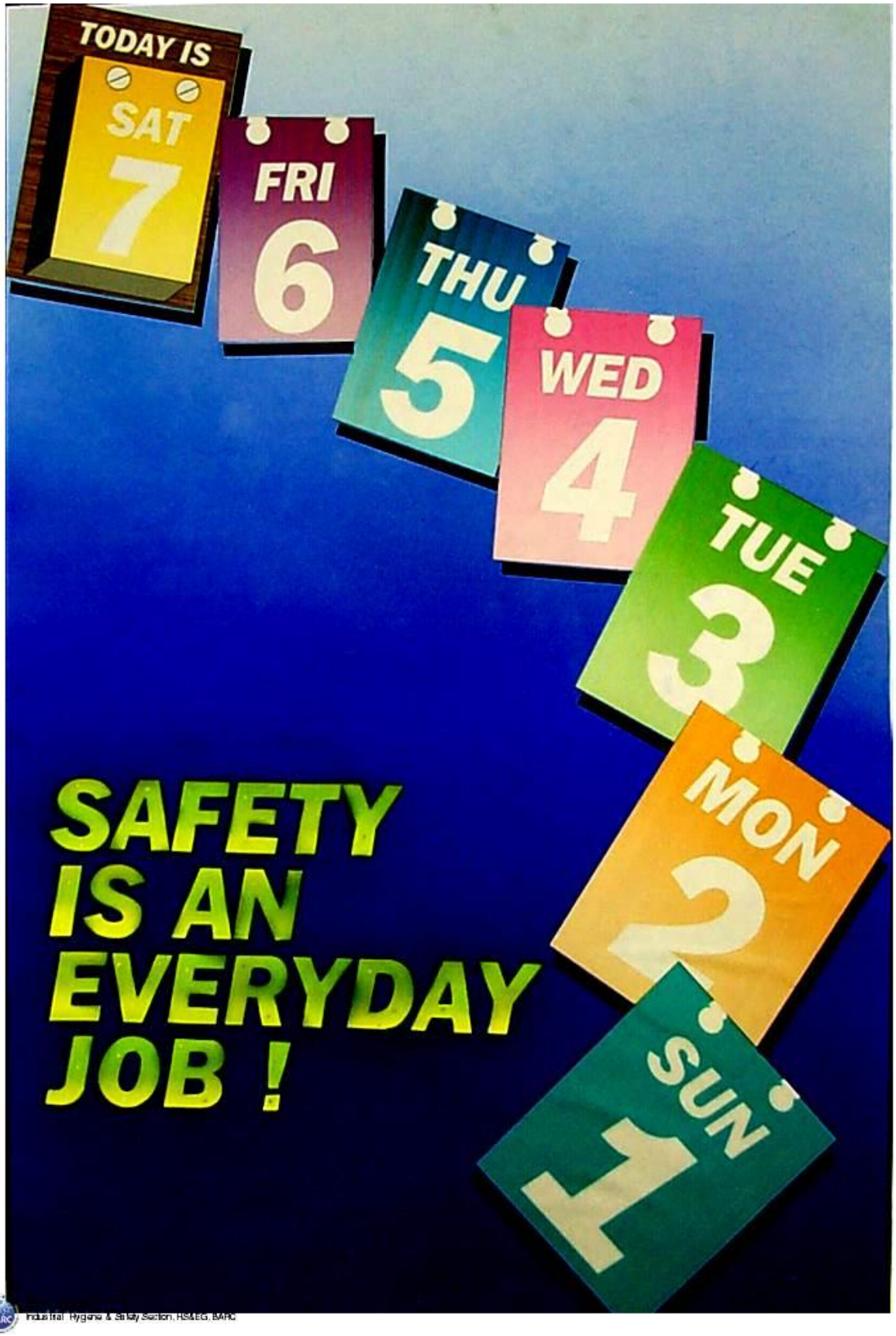
- Never leave tools on ledges, beams, or any other elevated places.

- Ensure that pipes or ducts are securely tied and latched to prevent movement or shifting when being transported on elevators or material hoists.

- Store all material in a safe and orderly manner

- Ensure that substantial barricades are erected around pits and trenches to protect employees, the public. Nothing should be stored or set within 2 feet of the trench's edge.

- Try to avoid the use of caustic drain cleaners. If it is necessary to use caustic drain cleaners, always use goggles and gloves and follow product instructions.


TODAY IS
SAT
7
FRI
6
THU
5
WED
4
TUE
3
MON
2
SUN
1
SAFETY
IS AN
EVERYDAY
JOB !
Poster Designby: Kailash Ghate I. HSS,HSEG,BARC
Industrial Hygiene & Safety Section, HS&EG, BARC

HAND TOOL SAFETY

General Hand Tool Safety

- Carry all sharp tools in a sheath or holster.
- Tag worn, damaged or defective tools “Out of service” and do not use them.
- Do not use a tool if its handle has splinters, burrs, cracks, splits or if the head of the tool is loose.
- Do not perform “make-shift” repairs to tools.
- Do not use impact tools such as hammers, chisels that have mushroomed heads.
- Do not carry tools in your hand when you are climbing. Carry tools in tool belts.
- Do not throw tools from one location to another or from one employee to another.
- Do not carry tools in your clothing. Transport hand tools only in tool boxes or tool belts.

Hammer



- Do not strike nails or other objects with the “cheek” of the hammer.
- Do not strike one hammer against another hammer.
- Do not use a hammer if your hands are oily, greasy or wet.
- Do not strike a hardened steel surface, such as cold chisel with a claw hammer

1. Saw



- Do not use a saw that has dull saw blades.
- Keep your hands and fingers away from the saw blade while you are using the saw.
- Do not carry a saw by the blade.
- When using the hand saw, hold the work piece firmly against the work table.

2. Screw driver



- Always match the size of screwdriver to fit the head of the screw.
- Do not force a screwdriver by using a hammer or pliers on it.
- Do not use a screwdriver as a punch, chisel or nail puller.
- Do not hold the workpiece against your body while using a screwdriver.
- Do not use a screwdriver if your hands are wet, oily or greasy.
- When you are performing electrical work use screwdriver which is insulated.
- Do not put your fingers near the blade of the screwdriver when tightening a screw.

3. Wrench



- Do not use wrenches that are bent, cracked or that have loose or broken handles.
- Do not use a shim to make a wrench fit.
- Do not use a wrench which has broken.

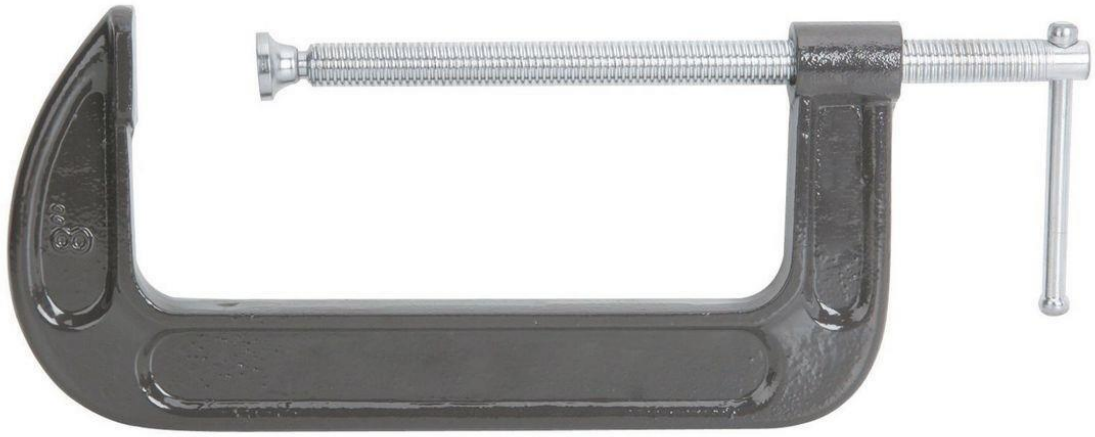
4. Pliers



- Do not use pliers as a wrench or hammer.
- Do not use pliers that are cracked, broken or sprung.

- When performing electrical work, use insulated pliers.
- Do not attempt to force pliers by using hammer on them

5. Clamp



- Do not use C- clamp for hoisting materials.
- Do not use C- clamp as a permanent fastening device.

6. Metal Snips



- Do not use snips as a hammer or screw driver.
- Wear safety glasses or safety goggles when using snips to cut materials.
- Wear work gloves when cutting materials with snips.
- Keep the blade aligned by tightening the nut and bolt on the snips.

LADDER SAFETY

STEP LADDER

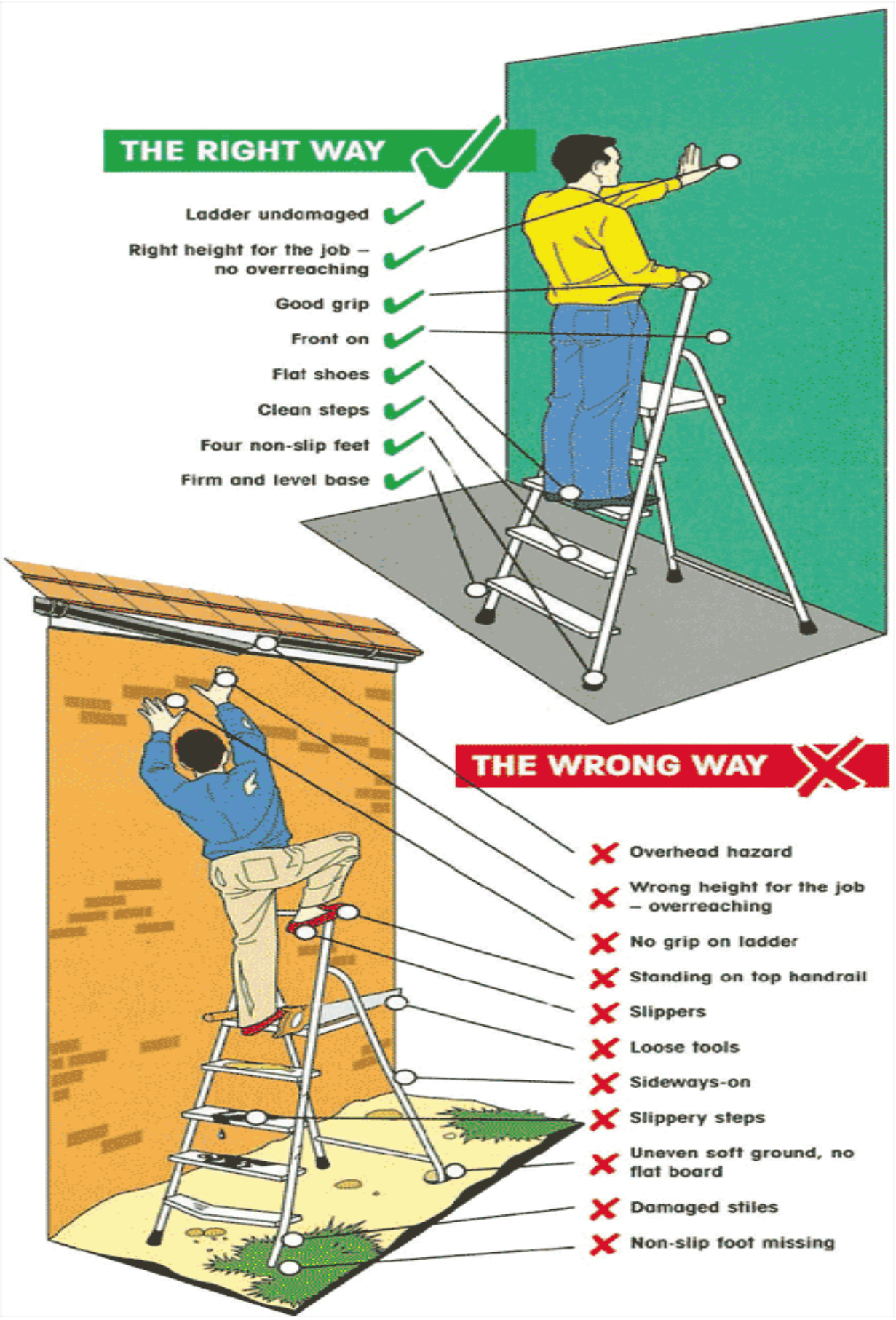
LADDER SAFETY – STEP LADDER



- Inspect all ladders completely before each use and set up the ladder properly. The inspection should include the hardware and fittings.

- Comply with the weight limits and specific uses prescribe for the ladder.

- Do not use defective ladder.
- Clean off any paint spilled on the ladder during use. Ladders should not be painted: defects may be covered by paint
- Secure ladders before climbing. If necessary, a second person should be present to hold the bottom from slipping. When on a ladder, the climber's body must be centered at all times.
- Never stand on the two top steps of a ladder.
- Set the ladder base firmly on the ground. Never place a step ladder on a desk, table, or other ladder.
- Metal ladders should not be used for electrical work or where they may contact electrical conductors. Use a wood or fiberglass ladder instead.
- Do not place ladders in front of a door unless the door is locked or adequately guarded.
- Select a ladder tall enough to reach the work. No attempts should be made to reach beyond a normal arm's length while standing on the ladder, especially to the side
- Do not attempt to move a ladder while still on it. Dismount and move the ladder to the new position.
- A hard hat may be necessary if hazards exist above the ladder.

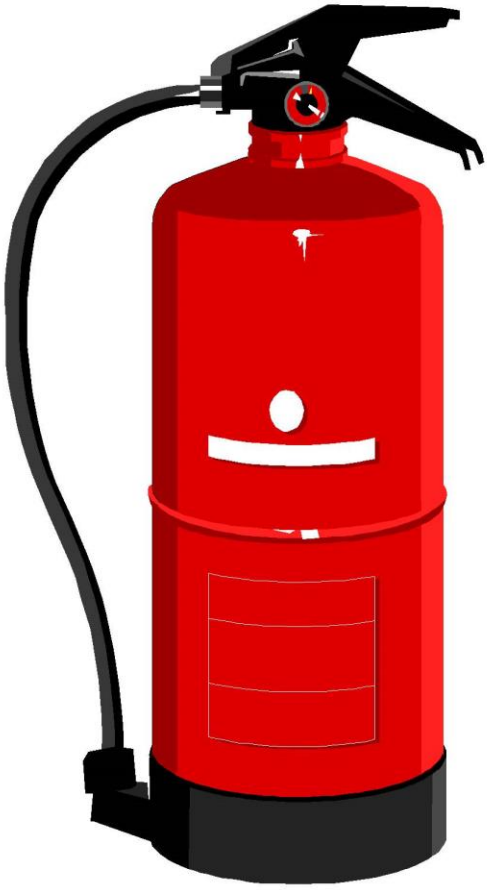

THE RIGHT WAY
Ladder undamaged
Right height for the job – no overreaching
Good grip
Front on
Flat shoes
Clean steps
Four non-slip feet
Firm and level base
THE WRONG WAY
Overhead hazard
Wrong height for the job – overreaching
No grip on ladder
Standing on top handrail
Slippers
Loose tools
Sideways-on
Slippery steps
Uneven soft ground, no flat board
Damaged stiles
Non-slip foot missing

FIRE SAFETY

Fire Safety

- Be aware of location of fire extinguishers at your work place and make sure how to operate them.
- Intimate your superiors and prescribed authority as soon as fire occurs.
- Try and extinguish the fire safely if you know the procedure thoroughly. If not, leave firefighting to the professionals.
- Know where emergency exits are located and ensure that they are not blocked,

LEARN HOW TO USE IT BEFORE IT'S TOO LATE !



IT MAY SAVE YOUR JOB
OR
YOUR LIFE

Industrial Hygiene & Safety Section
Health, Safety and Environment Group
BARC, Trombay, Mumbai


Fire
FIRE FEEDS ON CARELESSNESS
DON`T FEED IT !
DO NOT SMOKE IN FIRE-RISK AREAS.
KEEP CORRIDOR CLEAR OF ALL OBSTRUCTIONS.
KEEP EASY ACCESS TO FIRE EXTINGUISHERS.
Industrial Hygiene & Safety Section
Health, Safety and Environment Group
BARC, Trombay, Mumbai

FIRST AID

First aid

The aim and objective of the first aid are:

- To reduce the effects of the heat and to relieve pain.
- To lessen contamination and the risk of contamination.
- To reduce discomfort and swelling.
- To ensure that the patients takes sufficient fluids.

Procedure for Initial Treatment

Electric burns

- Dip the parts affected in the cold water.
- Make the parts dry and clean.
- Remove the items restricting blood circulation i.e. belts, rings, bangles, etc.
- Give small quantity of cold drinks at frequent intervals.
- In case burn is liable to get dirty, it should be covered by clean dressings till the medical assistance is received.

Chemical burns

- Flash the areas of injury with running water.
- Remove the contaminated clothing from the victim.
- Cover the affected areas with clean dressing till the medical assistance is received.

Severe bleedings

- Make the patient lie down and rest.
- If possible, raised the injured part above the level of the body.
- Apply pressure on the wound.
- Summon medical assistance immediately.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment

Personal Protective Equipment (PPE) is equipment that will protect the user against health or safety risk at work.

Common PPE'S required to be worn on work premises are:

- **Head protection** – safety helmet- to protect head from striking and falling objects.
- **Eye protectors**- safety glass, goggles and face shield-to protect eyes from dust, ultraviolet rays, welding shield, splinters and fumes.
- **Respiratory protectors**-breathing apparatus, dust mask-to protect respiratory system from dust, toxic gases and fumes.
- **Ear protectors**-earplug, ear muff- to protect ears from noisy atmosphere.
- **Hand protectors**-gloves-for protection of hand from cut, burns and injuries.
- **Fall protector**-safety harness –personnel fall arrester systems are designed to protect from falling heights.
- **Foot protectors**- safety shoes for the protection of foot from striking hazards and body from electrocution.

PPE must be properly looked after and stored when not in use eg in a dry and clean cupboard. If it is reusable it must be cleaned and kept in good condition**.**

Various Personal Protective Equipment



Safety Helmet



Goggles



Safety Glass



Fall protector



Face Shield



Gloves



Ear plug

Take Pride in your Personnel Protection Equipment (PPE)

It will save your life!



Essential – Not Optional

Poster Designby: Kailash Grant, HSS,HSEG,BARC

Industrial Hygiene & Safety Section, HS&EG, BARC


let us TARGET
EVERYDAY
TODAY will be our
ZERO
accident day
Industrial Hygiene & Safety Section
Health, Safety and Environment Group
Bhabha Atomic Research Centre
Slogan by: Shri R. K. Saxena, ISO, Safety Slogan Contest-2012, Organised by IHS Section, HSEG, BARC, Mumbai
Design by- Kailash Gharat, BARC

COMMENTS
&
SUGGESTIONS

Comments & Suggestions received:

“The appearance of cover page of manual is so attractive which produce interest to go through the manual. I gone through the manual and found the contents are relevant to day to day maintenance activities carried out in the DCSEM, manual covered most of the safety aspects and its language is short & simple to understand. It included the picture of daily use tools & safety equipment, enforcing the safety guidelines during daily work will really minimize the accidents.

Please add a poster of woman/family waiting at home for her dearest one if possible which indicates her sentiment also depend on safety of individual.

I wish to congratulate & thanks you for preparing such a nice document.”

Swami Nath,
Engineer-In-Charge
FF Section, GSS/DCSEM.

“The safety manual is very much informative & self-explanatory. It covers almost all the activities carried out by maintenance personnel of DCSEM. The language is very simple & easy to understand to everybody.

Thank you sir, for such nice information which we got in single attempt which is very rare. It can save some body's life after reading & following the safety aspects mentioned by you.”

Great job.”

P.T. Naukudkar,
Engineer-In-Charge,
(AC Works), DCSEM/GSS.

“I recently had the good fortune of reading your manual regarding day to day maintenance activities. It was well-written and contained sound, practical advice. I have read articles on similar subject, but none were as clear or as relevant as yours. Manual covered most of the safety aspects and its language is simple to understand. The pages are imbued with wisdom and compassion born of personal experience. You have captured every minuscule details in a picturesque manner. You pointed out several things that I will remember for years to come. I express my thanks for preparing such a nice document.

I look forward to reading your next informative work. Thank you.”

Tajinder Singh Lamba,
Scientific Officer-C
GSS, DCSEM.

“The "Safety Manual for DCSEM Maintenance Personnel" is well-written. It covers a wide range of safety aspects and is very informative, simple and easy to understand. The hazards associated with the maintenance works, the safety rules and safety precautions which are required to be taken, are remarkably explained with illustrations and apt phrases which are quite appealing and impressive. The efforts that have gone into the making of this 79 pages document are commendable. Thank you Sir, for preparing such a useful manual.

A safe and healthy workplace not only protects workers from injury and illness, it can also reduce absenteeism, increase efficiency and raise employee morale. If this manual is given wide publicity in the maintenance units, it will definitely help in enhancing safe work environment in this Directorate.”

Rajesh Shantaram Rediz,
Engineer-in-Charge,
General Services Section,
DCSEM.

"Thank you very much, for preparation of Safety Manual in such elaborate, practical and simple way.

The Manual is very attractive and relevant for Maintenance works. This will definitely help maintenance personal and DCSEM. My hearty congratulation to you for preparation of this document."

A.K. Jana,
Head, CQD,
DCSEM.