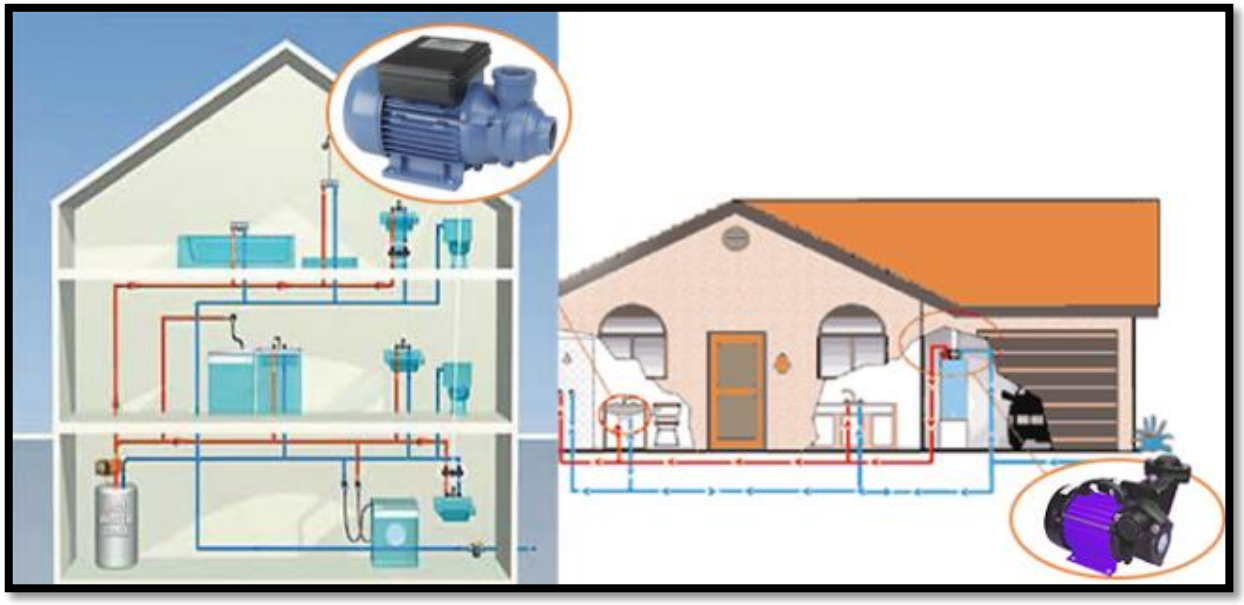
STANDARD OPERATION AND MAINTANANCE OF PUMP HOUSE

What is a Pump House?

A Pump House is a structure which accommodates the water pumping system components including electric motors, water pumps, water pipe networks and associated accessories, cabling systems and the electric motor control panels and other equipment that are associated with the pumping operation, as well as all the tools and accessories needed in the systems operation, repairs and maintenance.

Within the pump house compound, there may be need to have a separate structure to accommodate the generator and the associated tools and accessories needed to operate and maintain the generator. This structure, though closely associated with the pump house, is normally referred to as the **generator room**. The generator in this case may be used as the primary source of power for water pumping, or as a standby power source to be used in case of power mains power failure. Where a generator is used, **generator fuel** (diesel or petrol) must be stored in a separate structure to reduce the risk of fire.

Operation and maintenance practices for the pump house also apply to the generator room and fuel store where these are included in the pump house compound.



Pump house layout





Electric motors and pumps in a pump house

Electric motor control panels in pump house

Functions of a pump house

The following are the main functions of the pump house

Provides a safe and secure environment for the pumps and associated equipment, including safeguarding the machines, equipment and tools from the risk of theft, vandalism, flooding, fire, rain, direct sunlight, wind, moisture and dust

Provides a safe and secure environment for the personnel working on the pumping system

Provides a safe and convenient means of connecting electric power to the pumping system

PUMP HOUSE OPERATOR MAINTENANCE TASKS

The operator carries out the following operation and maintenance tasks in the pump house and compound

	Task	Frequency	Tools and material needed	Need for contractor
1.	Control access to the pump house and its compound	Constantly	Door and gate padlocks and keys	Fix locks
2.	Sweep and clean pump house and pump house compound	Daily	Brooms, mobs, buckets, water	Nil
3.	Check pump house structure for defects and repair as required	monthly	Appropriate tools for the specific repair task	Major repairs
4.	Check pump house perimeter fence for defects and repair as required	monthly	Appropriate tools for the specific repair task	Major repairs
5.	Read and record current and voltage to pump	Daily	Pump logbook, pen	Abnormal current and voltage readings
6.	Read and record electricity meter reading	Daily	Pump logbook, pen	Abnormal power consumption
7.	Read and record water meter readings	Daily	Pump logbook, pen	Abnormal pumping levels
8.	Control access to the generator/engine room	Constantly	Padlocks, keys	Fix locks
9.	Control access to the engine fuel store	Constantly	Padlocks, keys	Fix locks
10.	Maintain proper drainage in pump house compound	monthly	Jembe, shovel	Major repairs
11.	Keep fire extinguishers in the pump house	constantly	Hanging hooks, labels	Service the extinguishers when due
12.	Paint pump and generator house	occasionally	Brushes, paints	Painting job
13.	Open windows and ensure pump house is well ventilated	daily	Nil	Major repairs
14.	Check and repair leaks in pipe network	daily	Pliers, pipe wrench, accessories	Major leaks

15.	Apply poison to kill rodents and other vermin in the pump house compound	monthly	poisons	Major vermin control
16.	Fumigate to control termite and other insects in the pump house compound	monthly	Appropriate chemicals	Major fumigation

SAFETY RULES: GENERAL

1. **Keep idlers out of pump house**
2. **Only qualified personnel/contractors should undertake the necessary repairs**
3. **Keep fire extinguisher and bucket of sand close at hand to deal with fires;**
4. **Do not make any adjustments that you do not understand**
5. **Maintenance operations to be carried out under sufficient lighting**
6. **Maintenance operations on the electrical circuit should NEVER be undertaken when LIVE**
7. **No smoking or eating in pump house or fuel store**
8. **Wear protective clothing that fit well. No loose clothes that can get caught in the moving parts of the engine**
9. **Never put cleaning rugs or other loose items in your pockets when you are in the pump house. It can get caught in the moving parts**
10. **Wear good protective shoes.**
11. **Keep the floor of pump house and store clean and dry, so that you will not slip or fall.**
12. **Keep spectators out of pump house while engine is operating**
13. **Never work alone in a pump house. Always work in pairs to be available to assist each other in case of an emergency**
14. **Use appropriate personal protection equipment (PPE) when performing tasks (helmets, safety shoes, safety goggles, safety glasses, reflective jackets etc.)**
15. **Keep a record of all visitors to the pump house**

STANDARD OPERATION AND MAINTANANCE OF GRID POWER MOTOR CONNECTON

What is grid power connection?

Grid power motor connection is the means by which an electric load is connected onto a mains supply to enable safe and efficient utilization of the power. The electric load may be single (240 V) or three phase (415V).

Components of a grid power connection

Grid power connection consists of the following

	Element	Function
1.	Meter box	Lockable enclosure containing the mains switch, electricity meter, mains fuses
2.	Mains switch	To provide a safe means of isolating the mains electricity from the whole of premises
3.	Mains fuse/cut-out	• A removable fuse that when removed, disconnects mains supply. • Consists of three fuses and a neutral for three phase systems and one fuse and a neutral for single phase systems
4.	Consumer unit	Provided at the load center, it contains a number of circuit breakers in an enclosure
5.	Circuit breaker	Each circuit breaker offers protection against overload for a specific load circuit
6.	Cables	Several cables are connected to supply power to the various loads. Each cable is designed to carry a certain voltage and current. The cross-sectional area of the cable dictates
7.	Power factor correction plant	An equipment that improves the power factor of an electrical load, thus avoiding surcharge from the electricity utility company
8.	Electric motor Control panel	Equipment that control the operation of the electric motor while also protecting it from abnormal power conditions



Electricity Meter box/cabinet



Mains switch



Three phase fuses and energy meter



Consumer unit with circuit breakers

Grid motor connection operator maintenance tasks

The operator carries out the following operation and maintenance tasks in the grid motor connection system

	Task	Frequency	Tools and material needed	Need for contractor
1.	Ensure the electricity mains switchgear is inaccessible to all unauthorized persons	Always	Access door locks and keys	Fix locks
2.	Check grid motor connections and repair as required	monthly	Pliers, Phase tester, insulating tapes	Major repairs
3.	Read and record electricity meter reading	Monthly	Energy logbook, pen	Abnormal power consumption
4.	Keep fire extinguishers in the near meter cabinet	constantly	Hanging hooks, labels	Service the extinguishers when due
5.	Ensure electricity meter box is well ventilated	daily	Nil	Major repairs
6.	Apply poison to kill rodents, lizards and other vermin in the electricity meter box, as these can cause short circuits	Monthly	Poisons	Major vermin control
7.	Check the effectiveness of the electrical system earthing	Monthly	Multi-meter, Earthrod	Major repairs


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Safety Rules: Electricity

1. **Allow only authorized access the electricity meter box, and keep the visits short and to only a few people at a time.**
2. **Ensure every visitor to the electricity meter cabinet is well briefed in advance on the risks and necessary precautions**
3. **Only qualified and licensed personnel/contractors should undertake the necessary repairs on the electricity network**
4. **Keep fire extinguisher and bucket of sand close at hand to deal with fires;**
5. **Maintenance operations on the electrical circuit should NEVER be undertaken when LIVE**
6. **Use appropriate personal protection equipment (PPE) when performing tasks (helmets, safety shoes, safety goggles, safety glasses, reflective jackets etc.)**
7. **Keep a record of all visitors to the electricity meter cabinet**
8. **Avoid working with electricity with wet hands**
9. **If you have switched off the mains electricity supply to work on an equipment, always put up a sign on the service panel to prevent someone from turning the mains switch ON by accident**
10. **Always use insulated tools when working with electricity**
11. **Always treat all electrical devises as if they are LIVE**
12. **When working with electricity, never use metallic pens, pencils, rules or wear rings or metal watchbands**
13. **Always use wooden or fiberglass ladders when working with electricity at a height – not aluminum or metallic ladders**

What is electric shock?

- An electric shock occurs when a person comes into contact with an electrical energy source.
- Electrical energy flows through a portion of the body causing a shock.
- Exposure to electrical energy may result in no injury at all or may result in devastating damage or death.
- Burns are the most common injury from electric shock and lightning strikes
- There are three direct and two indirect types of electrical injuries:
    - Direct: -
        - Electrocution or death due to electrical shock
        - Electrical shock
        - Burns
    - Indirect:
        - Falls
        - Fire

First Aid for electric shock

i. **Turn off or separate the victim from the electrical source.** Unplug or shut off the power source. If turning off the power is not an immediate option, separate the person from the electrical source by using a dry, non-conducting object, such as a wooden broom, chair, or or the victim's own clothes, if dry.

ii. **Call for medical help.** Even if the person does not appear hurt, they still need medical attention. If there is more than one person at the scene, steps 1 and 2 should be performed simultaneously to increase likelihood of survival.

iii. **Apply mouth to mouth resuscitation if needed.** Only after being separated from the electrical source, check the victim's vital signs. Perform mouth to mouth resuscitation if breathing has stopped or seems slow.

iv. **Check for injuries.** For burn marks, rinse with cold running water and cover with a loose, clean, lint-free bandage or cloth. If the victim is bleeding, apply pressure and elevate the wounded area if possible. If spinal injury is suspected from a fall, avoid moving the victim's head or neck.

v. Inform medical professionals once they arrive. Be specific about what happened and notify them of all injuries noticed.