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Ministry of Labor and Skills

Plumbing Installation level III

Based on October, 2023, Curriculum Version II

Module Title: - Installing water pump sets

Module code: EIS PLI3 M05 1023

Duration: 90 Hour

Prepared by: Ministry of Labor and Skill

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Acronym

QA.....quality assurance

ISO.....international organization standards

TQM .....total quality management

OSHA .....occupational safety and health

PVC ..... poly vinyl chloride

Introduction to the Module

The Installing water pump sets helps to know the Basic concepts of water pump, identify installation requirements, Install water pump sets in plumbing installation field. This module cover skill, knowledge and attitude required to Installing water pump sets.

This module is designed to meet the industry requirement under the plumbing installation work occupational standard, particularly for the unit of competency: **Installing water pump sets This module covers the units**:

- Basic concepts of water pump
- Identify installation requirements.
- Install water pump sets

Learning Objective of the Module

- Identify Basic concepts of water pump
- Identify installation requirements
- Install water pump sets

Module Instruction

For effective use these modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: Basic concepts of water pump

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Overview of water pump
- Drawings and specification
- Safety OHS requirements
- Quality assurance and Statutory, regulatory & standards
- Materials, tools and equipment
- Installation of water pump set

Preparing water pump sets. This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Explain water pump
- Identify Drawings and specification
- Describe Safety OHS requirements
- Identify and quality assurance Statutory and regulatory
- Identify Materials tools and equipment
- Perform Prepare water pump sets

1.1. Overview of water pump

A water pump is a mechanical device designed to move water or other fluids from one place to another. Water pumps are commonly used in various applications, including residential, industrial, agricultural, and commercial settings. They play a crucial role in facilitating the transfer of water for purposes such as drinking water supply, irrigation, heating and cooling systems, wastewater removal, and more.

1.1.1. Types of water pump

There are two main types of water pumps: positive displacement pumps and centrifugal pumps.

Positive displacement pumps: trap a certain volume of water and then force it out of the pump. This type of pump is well-suited for applications where high pressure is required, such as pumping water over long distances or uphill.

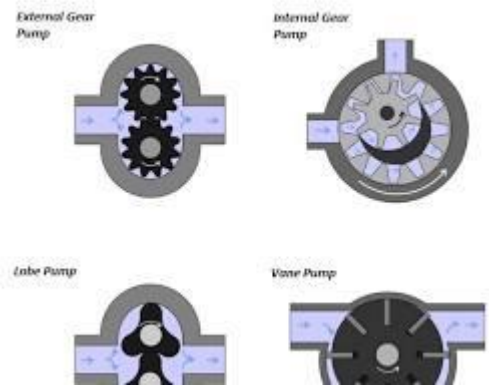

Figure 1-1 Positive displacement pump

Common types of positive displacement pumps:

1. **Reciprocating pumps:** These pumps use a piston to move water through a chamber.

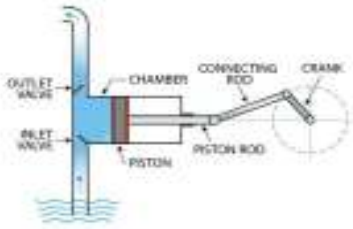

Figure 1.2 Reciprocating pumps

2. **Diaphragm pumps:** These pumps use a flexible diaphragm to move water through a chamber.

Figure 1.3 Diaphragm pumps

3. **Rotary piston pumps:** These pumps use a rotating piston to move water through a chamber.

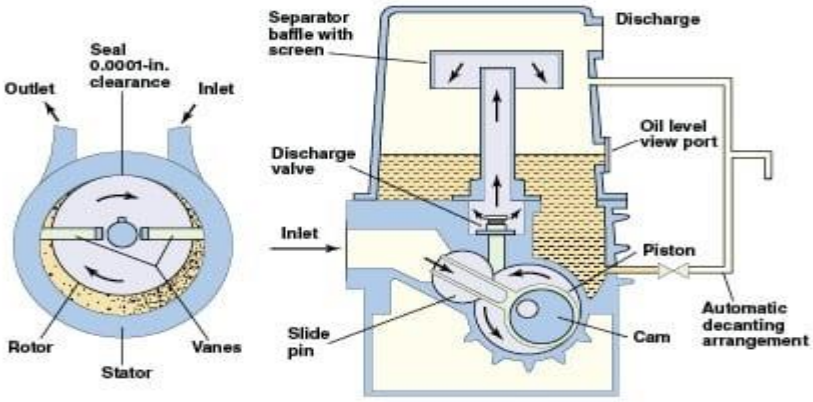

Figure 1.4 Rotary piston pumps

4. **Gear pumps:** These pumps use two gears to mesh together and move water through the pump.

Figure 1.5 Gear pumps

5. **Screw pumps:** These pumps use two screws to mesh together and move water through the pump.

Centrifugal pumps: use a rotating impeller to create a centrifugal force that moves the water through the pump. Centrifugal pumps are more efficient than positive displacement pumps and are well-suited for applications where high flow rates are required, such as pumping water from a well or a reservoir.

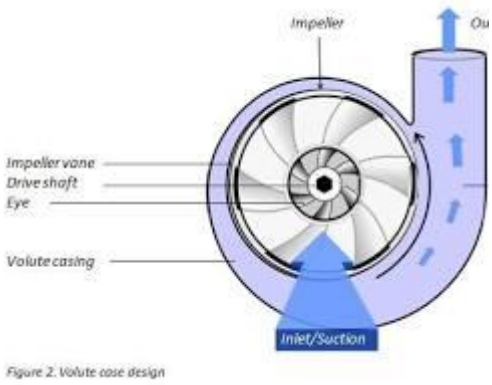

Figure 1-2 Centrifugal pump

Common types of centrifugal pumps:

1. **Single-stage centrifugal pumps:** These pumps have a single impeller and are typically used for lower pressure applications.

2. **Multistage centrifugal pumps:** These pumps have multiple impellers and are typically used for higher pressure applications.
3. **Submersible centrifugal pumps**: These pumps are designed to be submerged in water and are typically used for pumping water from wells and other bodies of water.

Figure 1.7 Submersible centrifugal pumps

Important to considerations of selecting a water pump:

1. **Head:** The head of a water pump is the vertical distance that the pump can lift water.
2. **Flow rate:** The flow rate of a water pump is the volume of water that the pump can move per unit time.
3. **Power source:** The power source of a water pump determines how and where the pump can be used.
4. **Water quality:** The water quality of the application determines the type of materials that the pump must be made of.

Water pumps are an essential part of many different industries and applications. By understanding the different types of water pumps and their applications, you can select the right pump for your needs.

The main components of a water pump are:

Impeller: The impeller is a rotating blade that creates pressure and flow in the water pump.

1. **Casing:** The casing is the outer shell of the water pump that holds the impeller and other components.
2. **Shaft:** The shaft is the rotating rod that connects the impeller to the pulley and engine.

3. **Bearings:** The bearings support the shaft and allow it to rotate smoothly.
4. **Seals:** The seals prevent water from leaking out of the water pump.

There is a more detailed description of each component:

1. **Impeller:** The impeller is the most important component of the water pump. It is a rotating blade that creates pressure and flow in the water pump. The impeller is typically made of metal, plastic, or ceramic.
2. **Casing:** The casing is the outer shell of the water pump that holds the impeller and other components. The casing is typically made of cast iron or aluminum.
3. **Shaft:** The shaft is the rotating rod that connects the impeller to the pulley and engine. The shaft is typically made of steel.
4. **Bearings:** The bearings support the shaft and allow it to rotate smoothly. The bearings are typically made of metal or plastic.
5. **Seals:** The seals prevent water from leaking out of the water pump. The seals are typically made of rubber or ceramic.

All of these components work together to create a water pump that can circulate coolant throughout the engine's cooling system. This helps to keep the engine running cool and prevent it from overheating.

Water pumps are used in a variety of applications, including automobiles, trucks, boats, and industrial machinery. The specific components of a water pump may vary depending on the application, but the basic design and function is the same.

Water pump performance is measured by three main factors: head, flow rate, and power.

Head: is the vertical distance that the water pump can lift the water. It is measured in feet or meters.

Flow rate: is the volume of water that the water pump can move per unit time. It is measured in gallons per minute (GPM) or cubic meters per hour (M^3/h).

Power: is the amount of energy that the water pump consumes. It is measured in watts or horsepower.

Efficiency: is the ratio of the water pump's output power to its input power. It is expressed as a percentage.

These three factors are interrelated. For example, increasing the head will require more power, and decreasing the flow rate will increase the efficiency.

The performance of a water pump is typically represented by a pump curve. A pump curve is a graph that shows the relationship between head, flow rate, and power. Pump curves are used to select the right water pump for a particular application.

There are some examples of how water pump performance is important in different applications:

- In a home irrigation system, a water pump with a high head and flow rate is needed to deliver water to the sprinklers and other irrigation devices.
- In a commercial swimming pool, a water pump with a high head and flow rate is needed to circulate the water and keep the pool clean and free of debris.
- In a cooling system for a power plant, a water pump with a high head and flow rate is needed to circulate the coolant and keep the power plant running cool.

When selecting a water pump, it is important to consider the specific requirements of the application. By understanding the relationship between head, flow rate, power, and efficiency, you can choose the right water pump for your needs.

When selecting a water pump, there are four key factors to consider:

- **Head requirements:** This is the vertical distance that the water pump needs to lift the water. It is important to consider the elevation difference between the water source and the discharge point, as well as any friction losses in the piping.
- **Flow rate requirements:** This is the volume of water that the water pump needs to deliver per unit time. It is important to consider the needs of the application, such as the number of sprinklers in an irrigation system or the size of a swimming pool.
- **Power source:** Water pumps can be powered by electricity, gas, or diesel. It is important to choose a power source that is available and affordable for your needs.

- **Water quality:** The water quality of the source water can affect the type of water pump that is needed. For example, if the water is corrosive, a stainless steel water pump may be required.

Once you have considered these four factors, you can start to narrow down your choices. It is a good idea to compare different water pumps from different manufacturers to find the best one for your needs.

Additional tips for selecting awater pump:

- Choose a water pump that is slightly oversized for your needs. This will help to ensure that the pump does not have to work too hard, which will extend its lifespan.
- Consider the noise level of the water pump. If the pump is going to be installed in a residential area, you may want to choose a quieter model.
- Make sure that the water pump is easy to maintain. The pump should have easy access to the impeller and other components for cleaning and inspection.
- Choose a water pump from a reputable manufacturer. This will help to ensure that the pump is well-made and that it is backed by a good warranty.

Water Pump Operation and Maintenance

Priming the pump

Before starting a water pump, it is important to prime it. This means filling the pump with water so that it can start pumping. To prime a water pump, follow these steps:

1. Open the valve on the discharge side of the pump.
2. Pour water into the inlet of the pump until it is full.
3. Close the valve on the discharge side of the pump.
4. Start the pump.

Starting and stopping the pump

To start a water pump, simply turn on the power switch. To stop a water pump, turn off the power switch.

Troubleshooting common problems

If your water pump is not working properly, there are a few common problems that you can check:

- **The pump is not primed:** Make sure that the pump is primed before starting it.
- **The pump is not getting enough power:** Check that the power switch is turned on and that the pump is plugged into a working outlet.
- **The pump is clogged:** Check the inlet and outlet of the pump for any debris that may be clogging it.
- **The pump is leaking:** Check the seals and gaskets on the pump for any leaks.

If you are unable to troubleshoot the problem yourself, contact a qualified technician for assistance.

Preventive maintenance

To keep your water pump in good condition, it is important to perform regular preventive maintenance.

This includes:

- Checking the oil level in the pump and changing the oil as needed.
- Inspecting the pump for any leaks or damage.
- Cleaning the inlet and outlet of the pump to remove any debris.

Additional safety tips for operating and maintaining a water pump:

- Always wear safety glasses and gloves when working on a water pump.
- Be careful not to over tighten the fittings on the pump, as this can damage the pump.
- Never operate a water pump if it is leaking or damaged.
- Always shut off the power to the pump before working on it.

Water pumps are used in a wide variety of applications, including:

- **Municipal water supply:** Water pumps are used to pump water from wells and reservoirs

into the municipal water distribution system.

- **Industrial water treatment:** Water pumps are used to circulate water through cooling towers, boilers, and other industrial water treatment systems.
- **Agricultural irrigation:** Water pumps are used to irrigate crops.
- **Domestic plumbing:** Water pumps are used to boost water pressure in homes and businesses.
- **Flood control:** Water pumps are used to remove water from flooded areas.
- **Groundwater remediation:** Water pumps are used to pump contaminated groundwater to the surface for treatment.

Specific examples of how water pumps are used in each of these applications:

- **Municipal water supply:** Water pumps are used to pump water from wells into water treatment plants. At the water treatment plant, the water is filtered and treated to make it safe to drink. Once the water is treated, it is pumped into the municipal water distribution system, which delivers the water to homes and businesses.

Figure 1.8 Municipal water supply

- **Industrial water treatment:** Water pumps are used to circulate water through cooling towers, boilers, and other industrial water treatment systems. Cooling towers are used to cool water that has been used in industrial processes. Boilers are used to heat water for industrial processes. Industrial water treatment systems are used to remove impurities from water so that it can be reused in industrial processes.

Figure 1.9 Industrial water treatment

- **Agricultural irrigation:** Water pumps are used to irrigate crops. Water pumps can be used to draw water from wells, rivers, or lakes. The water is then pumped through a network of pipes and sprinklers to irrigate the crops.

Figure 2. Agricultural irrigation

- **Domestic plumbing:** Water pumps are used to boost water pressure in homes and businesses. Water pressure is important for many household and business activities, such as bathing, showering, flushing the toilet, and running the dishwasher.

Figure 2.1 Domestic plumbing

- **Flood control:** Water pumps are used to remove water from flooded areas. Water pumps can be used to pump water from flooded homes and businesses, as well as from flooded streets and fields.

Figure 2.2 Flood control

- **Groundwater remediation:** Water pumps are used to pump contaminated groundwater to the surface for treatment. Groundwater remediation is the process of cleaning up contaminated groundwater. Water pumps are used to pump the contaminated groundwater to the surface, where it can be treated and then returned to the aquifer.

Water pumps are an essential part of many modern societies. They are used to provide clean water for drinking, irrigation, and industrial processes. Water pumps are also used to protect people and property from flooding.

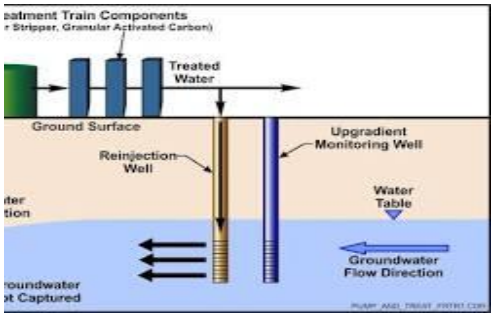

Figure 2.3 Groundwater remediation

1.2. Drawings and specification

Drawings and specifications for water pump sets are technical documents that provide

information on the design, construction, and operation of a water pump set. These documents are essential for the safe and efficient installation and operation of water pump sets.

1.2.1. Important of drawings and specifications for water pump sets

Drawings and specifications for water pump sets are important for a number of reasons, including:

To ensure that the water pump set is designed and constructed to meet the specific needs of the application. Drawings and specifications provide detailed information on the design and construction of the water pump set, including the types of materials used, the dimensions of the components, and the performance requirements. This information is essential for ensuring that the water pump set is able to safely and reliably perform the required task.

- To provide information on the safe and efficient operation and maintenance of the water pump set. Drawings and specifications typically include instructions on how to start, stop, and operate the water pump set safely. They also include information on how to maintain the water pump set to ensure its continued safe and efficient operation.
- To serve as a record of the design and construction of the water pump set. Drawings and specifications provide a permanent record of the design and construction of the water pump set. This information can be useful for troubleshooting problems with the water pump set, as well as for making modifications to the water pump set in the future.

Important of water pump sets drawings and specifications

- A contractor who is installing a water pump set in a commercial building needs to use the drawings and specifications to ensure that the water pump set is installed correctly and that it meets the performance requirements for the building.
- A technician who is maintaining a water pump set in a factory needs to use the drawings and specifications to troubleshoot problems with the water pump set and to perform routine maintenance tasks.
- A regulatory authority needs to review the drawings and specifications for a water pump set before it can be installed and operated in a public water supply system.

1.2.2. Types of drawings and specifications for water pump sets

There are many different types of drawings and specifications for water pump sets. The specific types of drawings and specifications that are required will vary depending on the application and the complexity of the water pump set.

There are some of the most common types of drawings and specifications for water pump sets

Assembly drawings: Assembly drawings show how the different components of the water pump set are assembled. These drawings are typically used by contractors and technicians to install and maintain water pump sets.

- **Exploded drawings:** Exploded drawings show the different components of the water pump set disassembled. These drawings are typically used for troubleshooting problems with water pump sets and for creating parts lists.
- **Schematic drawings:** Schematic drawings show the flow of water and power through the water pump set. These drawings are typically used for understanding the operation of water pump sets and for troubleshooting problems.
- **Detail drawings:** Detail drawings provide detailed information on the individual components of the water pump set. These drawings are typically used for manufacturing and repairing water pump components.
- **Performance specifications:** Performance specifications define the required performance of the water pump set, such as flow rate, head, and power consumption. These specifications are typically used to select the appropriate water pump set for a particular application.
- **Material specifications:** Material specifications define the materials that are to be used in the construction of the water pump set. These specifications are important for ensuring the durability and reliability of the water pump set.
- **Manufacturing specifications:** Manufacturing specifications define the manufacturing processes that are to be used to construct the water pump set. These specifications are important for ensuring that the water pump set is manufactured to a high standard of quality.
- **Testing specifications:** Testing specifications define the tests that are to be performed on the

water pump set to ensure that it meets the required performance specifications. These specifications are important for ensuring the safety and reliability of the water pump set.

In addition to the above, there are a number of other types of drawings and specifications that may be required for water pump sets, such as installation drawings, operation and maintenance manuals, and spare parts manuals.

The specific types of drawings and specifications that are required for a particular water pump set will be specified by the manufacturer or the engineer responsible for the design of the water pump set.

Reading drawings for water pump sets

Reading drawings for water pump sets is an essential skill for anyone who works with these systems. Drawings provide detailed information on the design and construction of the water pump set, including the types of materials used, the dimensions of the components, and the performance requirements. This information is essential for understanding how the water pump set works and for ensuring its safe and reliable operation.

The first step in reading drawings for water pump sets is to understand the different symbols and conventions that are used. There are a number of standard symbols and conventions that are used in engineering drawings, and these same symbols and conventions are typically used in drawings for water pump sets.

Most common symbols and conventions used in drawings for water pump sets:

- **Lines:** Different types of lines are used to represent different components in a drawing. For example, solid lines are used to represent visible components, dashed lines are used to represent hidden components, and center lines are used to represent the center of symmetrical components.
- **Views:** Drawings typically include multiple views of a component or system. These views show the component or system from different angles, which helps to provide a complete understanding of its design.
- **Dimensions:** Dimensions are used to indicate the size and location of components in a drawing. Dimensions are typically given in millimeters or inches.

- **Notes:** Notes are used to provide additional information on the drawing, such as the types of materials used, the manufacturing requirements, or the testing specifications.

1.2.3. Interpreting the information presented in drawings for water pump sets

Once you understand the different symbols and conventions used in drawings for water pump sets, you can begin to interpret the information that is presented in the drawings.

To interpret the information in a drawing for a water pump set, start by identifying the main components of the system. These components will typically include the pump, the motor, the piping, and the valves.

Once you have identified the main components, you can begin to understand how the system works by following the flow of water through the system. The drawings will typically show the direction of flow using arrows.

The notes in the drawings can also provide important information on the water pump set, such as the types of materials used, the manufacturing requirements, or the testing specifications.

There are some tips for reading drawings for water pump sets:

- Start by identifying the main components of the system.
- Follow the flow of water through the system to understand how it works.
- Use the dimensions in the drawings to determine the size and location of the different components.
- Read the notes in the drawings to obtain additional information on the water pump set.
- If you are unsure about how to interpret a particular piece of information, consult with a qualified engineer or technician.

Creating drawings for water pump sets is an essential skill for engineers and technicians who work with these systems. Drawings provide detailed information on the design and construction of the water pump set, including the types of materials used, the dimensions of the components, and the performance requirements. This information is essential for manufacturing, installing, and operating water pump sets safely and efficiently.

1.2.4. Specifications for water pump sets

Specifications for water pump sets are technical documents that outline the performance, materials, manufacturing, and testing requirements for a set. They are crucial for ensuring the set's design, construction, operation, and maintenance. They define the required performance, materials, and manufacturing processes. They also provide instructions for safe operation and maintenance, serve as a permanent record of the set's design and construction, and may be required by regulatory authorities for installation and operation. These specifications are essential for maintaining the set's safety and efficiency.

Water pump sets require various specifications, including performance, material, manufacturing, and testing. These specifications define the required performance, materials used, manufacturing processes, and testing to ensure the set meets performance requirements. Other types include installation, operation, maintenance, and spare parts manuals. Writing and reading specifications for water pump sets should be clear, concise, and specific, using standard terminology and conventions. Understanding the different types of specifications and their information is crucial for interpreting them and ensuring the set meets the specific needs of the application. Consultation with a qualified engineer or technician is recommended.

1.3. Safety OHS requirements

Occupational Health and Safety (OHS) requirements for water pump sets vary depending on the specific jurisdiction. However, some general requirements include:

- **Proper training:** All workers who operate or maintain water pump sets should be properly trained on the safe use of the equipment. This training should cover topics such as identifying and avoiding hazards, operating procedures, and emergency response.
- **Personal protective equipment (PPE):** Workers should wear appropriate PPE when operating or maintaining water pump sets. This may include safety glasses, gloves, ear protection, and hard hats.
- **Safe work practices:** Workers should follow safe work practices when operating or maintaining water pump sets. This includes things like keeping the work area clean and free of hazards, locking out and tagging out the equipment before performing maintenance, and

using proper lifting and handling techniques.

- **Regular inspection and maintenance:** Regular inspection and maintenance of water pump sets are crucial for their safety, including checking for leaks, cracks, and damage. Some jurisdictions may require specific OHS requirements, such as guards and well-lit, ventilated areas.

1.3.1. Quality Assurance

Quality assurance (QA) is the process of ensuring that a product or service meets certain standards of quality. For water pump sets, QA typically involves a combination of inspections, tests, and audits.

Common QA requirements for water pump sets:

- **Design review:** The design of the water pump set should be reviewed to ensure that it meets all applicable standards and requirements.
- **Materials testing:** The materials used in the construction of the water pump set should be tested to ensure that they meet the required specifications.
- **Performance testing:** The water pump set should be tested to ensure that it meets its performance requirements, such as flow rate and pressure head.
- **Quality control:** Quality control inspections should be performed at various stages of the manufacturing process to ensure that the water pump set is being built to the required standards.

1.3.2. Statutory, Regulatory, and Standards

Water pump sets are subject to a variety of statutory, regulatory, and standards requirements. These requirements vary depending on the jurisdiction in which the water pump set is being used

Common requirements include:

- **Safety standards:** Water pump sets must comply with all applicable safety standards, such as those related to electrical safety and mechanical safety.
- **Environmental standards:** Water pump sets must comply with all applicable environmental standards, such as those related to noise emissions and energy efficiency.

- **Performance standards:** Water pump sets must comply with all applicable performance standards, such as those related to flow rate, pressure head, and efficiency.

1.4. Materials, tools and equipment

The materials, tools, and equipment needed for a water pump set will vary depending on the specific type of pump and the application.

General items that may be needed include:

1. **Pump:** The pump is the main component of the water pump set. It is responsible for moving the water from one point to another. There are many different types of pumps available, so it is important to choose the right one for the specific application.
2. **Motor:** The motor provides the power to operate the pump. It is important to choose a motor that is compatible with the pump and that is powerful enough to meet the needs of the application.
3. **Base:** The base provides a platform for the pump and motor to sit on. It is important to choose a base that is sturdy enough to support the weight of the pump and motor, and that is level so that the pump does not vibrate excessively.
4. **Piping:** Piping is used to connect the pump to the water source and to the discharge point. It is important to choose piping that is the correct size and type for the application.
5. **Valves:** Valves are used to control the flow of water through the pump system. It is important to choose valves that are compatible with the piping and that are rated for the pressure and temperature of the water.
6. **Fittings:** Fittings are used to connect the piping and valves together. It is important to choose fittings that are compatible with the piping and valves, and that are rated for the pressure and temperature of the water.
7. **Electrical wiring:** Electrical wiring is used to connect the motor to the power source. It is important to choose wiring that is the correct size and type for the motor, and that is installed in accordance with electrical codes.

1.5. Installation of water pump set

The installation of a water pump set will vary depending on the specific type of pump and the application.

However, there are some general steps that can be followed:

1. Choose the right location for the water pump set. The pump should be located in a dry, well-ventilated area. It should also be located near the water source and the discharge point.
2. Prepare the base for the water pump set. The base should be level and sturdy enough to support the weight of the pump and motor.
3. Connect the piping to the pump. Be sure to use the correct size and type of piping for the application.
4. Connect the valves to the piping. Be sure to use valves that are compatible with the piping and that are rated for the pressure and temperature of the water.
5. Connect the electrical wiring to the motor. Be sure to use wiring that is the correct size and type for the motor and that is installed in accordance with electrical codes.
6. Prime the pump. This involves filling the pump with water and removing any air from the system.
7. Test the pump system. Once the pump is primed, turn it on and check for leaks.

Self-check-1

Part-I: Choose the correct answer

1. Water pumps are used to:

A. Transport water from one location to another

B. Increase the pressure of water

C. Both A and B

D. None of the above

2. The two main types of water pumps are:

A. Positive displacement pumps and dynamic pumps

B. Centrifugal pumps and reciprocating pumps

C. Both A and B

D. None of the above

3. Water pump drawings typically include:

A. A general arrangement drawing

B. A bill of materials

C. A detail drawing of each component

D. All of the above

4. The water pump specification should include all of the following information, except:

A. The type of pump

B. The flow rate

C. The head pressure

D. The power requirements

E. The manufacturer's name and model number

5. When working on a water pump, it is important to follow all safety OHS requirements, including:

A. Wearing appropriate personal protective equipment (PPE)

B. Following the manufacturer's instructions

C. Disconnecting the power supply before starting any work

D. All of the above

6. Water pumps must be manufactured and tested in accordance with all applicable statutory, regulatory, and standards requirements. These requirements may vary depending on the country or region where the pump is being used.

7. The materials used to manufacture water pumps vary depending on the type of pump and the application. Common materials include:

A. Cast iron
B. Stainless steel
C. Bronze
D. All of the above

8. The tools and equipment needed to install a water pump will vary depending on the type of pump and the installation site. Common tools and equipment include:

A. Wrenches
B. Screwdrivers
C. Pliers
D. All of the above

9 . When installing water pump set it is important to follow the manufacturer's instructions carefully. Some important steps include:

A. Selecting the correct pump for the application
B. Installing the pump on a level surface
C. Connecting the pump to the water supply and discharge piping
D. Priming the pump before starting it up
E. All of the above

Part-II: Say true for right statement and false for wrong one

1. A water pump is a device used to transfer water from one location to another.
2. Drawings and specifications provide detailed information about the design and functionality of a water pump.
3. Safety OHS requirements are essential to ensure the safe operation and use of water pumps.
4. Quality assurance ensures that water pumps comply with statutory, regulatory, and standards requirements.

Part-III: Answer the following questions accordingly

1. What is the purpose of a water pump?

Answer: The purpose of a water pump is to transfer water from one location to another.

2. What do drawings and specifications provide for a water pump?

Answer: Drawings and specifications provide detailed information about the design and functionality of a water pump.

3. Why are safety OHS requirements important for water pumps?

Answer: Safety OHS requirements are important for water pumps to ensure the safe operation and use, preventing accidents or injuries.

4. What does quality assurance ensure in relation to water pumps?

Unit two: Identify installation requirements.

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Pump location and following site inspection
- Identifying, ordering and collecting materials and equipment
- Appling sustainability principles and concepts

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Describe pump location and following site inspection
- Identify ordering and collecting materials and equipment
- Apply sustainability principles and concepts

2.1. Pump location and site inspection

The pump location and site inspection are essential aspects of the plumbing and water supply system in a building. Properly locating pumps and conducting site inspections ensure efficient and reliable water distribution. Here's an explanation of each aspect:

1. Pump Location:

Pump location refers to the specific placement of pumps within a plumbing or water supply system. It involves selecting and positioning pumps at strategic points to achieve the desired functionality, such as boosting water pressure, facilitating water circulation, or pumping wastewater. The location of pumps is a critical aspect of system design, ensuring that they are situated in a manner that optimizes their performance and efficiency.

- **Purpose of Pump:** Pumps are commonly used to boost water pressure or facilitate the movement of water in plumbing systems. The location of pumps depends on their purpose and the specific needs of the building.
- **Types of Pumps:** There are different types of pumps used in plumbing systems, including booster pumps, circulation pumps, sewage pumps, and sump pumps. Each serves a specific function and may be located at different points in the system.
- **Pressure Boosting:** Booster pumps are typically located near the water source, such as a well or municipal supply, to increase water pressure throughout the building. These pumps are often installed in a dedicated pump room or enclosure.
- **Circulation Pumps:** In recalculating hot water systems, circulation pumps may be located near the water heater to ensure quick hot water delivery to fixtures. They can also be installed at points where hot water return lines connect to the main supply.
- **Sewage and Sump Pumps:** Sewage and sump pumps are installed in or near areas where wastewater or storm water needs to be pumped out, such as basements, crawlspaces, or sewage pits.

2. Site Inspection:

Site inspection is the process of physically evaluating a location or site to assess its suitability and conditions for various purposes, including construction, installation, or infrastructure development. In the context of plumbing and water supply systems, a site inspection involves examining the physical attributes of the site where plumbing components, including pumps and pipes, will be installed. This inspection is conducted to ensure that the chosen site meets safety, access, and regulatory requirements and is compatible with the intended purpose of the installation.

1. **Purpose of Site Inspection:** A site inspection is conducted to evaluate the physical conditions and requirements of the location where plumbing components, including pumps, will be installed. It ensures that the chosen location is suitable for the intended purpose.

2 .Key Considerations: During a site inspection, various factors are assessed, including:

- Available space and clearances for equipment installation.
- Accessibility for maintenance and repairs.
- Safety considerations to prevent potential hazards, such as flooding or electrical risks.
- Compatibility with local building codes and regulations.

3. Documentation: The findings of the site inspection should be documented, and any necessary adjustments or modifications to the installation plan should be noted. This documentation can be valuable for compliance with local building codes and as a reference for future maintenance.

4. Qualified Inspection: Site inspections are typically conducted by qualified professionals, such as plumbers, engineers, or building inspectors. They ensure that the plumbing components are installed in a safe and compliant manner.

2.2. Identifying, ordering and collecting materials and equipment

Identifying, ordering, and collecting materials and equipment for a water pump set is a crucial step in the installation and maintenance of water pumping systems. It involves a series of actions to ensure that the necessary components and tools are available for the installation or servicing of a water pump set.

An overview of the process:

1. **Identifying Materials and Equipment:** Determine the specific materials and equipment required for the water pump set based on the system's design, specifications, and the purpose of the pump (e.g., well pump, booster pump, sewage pump).

   Create a list of all necessary items, including pumps, pipes, fittings, valves, electrical components, control panels, and any specialized tools.

2. **Sourcing and Ordering:** Identify suppliers, manufacturers, or distributors that offer the required materials and equipment. This may involve contacting local hardware stores, plumbing supply companies, or specialized pump suppliers.

   Obtain price quotes, lead times, and availability information from multiple sources to compare options.

   Place orders for the materials and equipment, ensuring that the quantities and specifications match the project requirements.

   Verify that the ordered items meet any regulatory or quality standards applicable to the water pump system.

3. **Coordinating Deliveries:** Coordinate with suppliers and vendors to schedule the delivery of the ordered materials and equipment to the project site. Ensure that the deliveries are timed to align with the installation or maintenance schedule to minimize delays and storage costs.
4. **Inspection and Quality Control:** Upon delivery, inspect the materials and equipment for any damage, defects, or discrepancies. Ensure that all items conform to the specified standards and meet the project requirements. Document the condition of the items and address any issues with the supplier as necessary.
5. **Storage and Organization:** Safely store the materials and equipment on-site, taking precautions to protect them from environmental factors and theft.Organize the items in a way that allows for easy access and efficient assembly during the installation process.
6. **Inventory Management:** Maintain an inventory list to track the quantities, types, and locations of all materials and equipment. This helps prevent shortages or overages and assists in project management.
7. **Safety and Security:** Ensure that safety measures are in place to protect the materials and equipment from theft or vandalism on the project site.Effective management of materials and equipment is critical to the success of a water pump installation or maintenance project. It ensures that the necessary components are available when needed, preventing delays and cost overruns. Additionally, it contributes to the overall safety and quality of the installation.

2.3 Appling sustainability principles and concepts

Applying sustainability principles and concepts when working with water pump sets is essential to ensure efficient and environmentally responsible water management.

Ways to integrate sustainability into the design, installation, and operation of water pump sets:

1. **Energy Efficiency:** Choose energy-efficient water pumps and motors. Look for pumps with high hydraulic efficiency and motors that meet energy efficiency standards.
2. Utilize variable frequency drives (VFDs) to control the speed of the pump motor, which can reduce energy consumption by matching pump output to demand.
3. **Renewable Energy Sources:** Consider incorporating renewable energy sources, such as solar panels or wind turbines, to power water pumps, especially in off-grid or remote locations. This reduces reliance on fossil fuels and lowers carbon emissions.
4. **Water Conservation:** Implement water-saving technologies like rainwater harvesting and gray water recycling systems. These can reduce the demand on water pumps by using alternative water sources for non-potable purposes.
5. **Proper Sizing:** Ensure that the water pump is correctly sized for the intended application. An oversized pump can lead to excessive energy consumption and wear, while an undersized pump may not meet the water demand.
6. **Maintenance Practices:** Establish a regular maintenance schedule to keep the pump and associated equipment in optimal working condition. Well-maintained pumps are more efficient and have a longer lifespan, reducing the need for replacement and waste.
7. **Monitoring and Control:** Install monitoring and control systems that allow remote monitoring of pump performance. This enables timely detection of issues, preventing energy waste and inefficiencies.
8. **Leak Detection:** Implement leak detection systems in the water distribution network to identify and repair leaks promptly. Reducing water loss contributes to sustainability by conserving a precious resource.
9. **Lifecycle Analysis:** Consider the entire lifecycle of the water pump set, from production to

disposal. Opt for products and materials with lower environmental impact, and recycle or properly dispose of old equipment.

10. **Compliance with Regulations:** Ensure that your water pump system complies with local, state, and federal regulations related to water quality, safety, and environmental protection.
11. **Community and Stakeholder Engagement:** Engage with local communities and stakeholders to raise awareness about water conservation, encourage responsible water use, and involve them in sustainable water management practices.
12. **Training and Education:** Provide training and educational resources for staff and end-users to promote water conservation and sustainable pump operation.
13. **Waste Reduction:** Minimize waste generation during the installation and maintenance of water pump sets by reusing materials and properly disposing of waste.

Integrating sustainability principles into water pump systems not only benefits the environment but can also lead to cost savings through reduced energy and water consumption, extended equipment life, and decreased maintenance expenses. Additionally, it contributes to the responsible use of water resources, which is crucial for the well-being of communities and ecosystems.

Self –check-2

Part-I: Choose the correct answer.

1. Pump location and site inspection involve:

A. Determining the most convenient location for the pump.

B. Assessing the site for potential hazards or obstructions.

C. Checking the availability of power supply.

D. All of the above.

2. Which of the following is an essential step in identifying, ordering, and collecting materials and equipment for pump installation?

A. Conducting market research to find the lowest prices.

B. Reviewing the project specifications and requirements.

C. Ordering excessive quantities to ensure availability.

D. Skipping the identification process and directly ordering materials.

3. When applying sustainability principles and concepts to pump installation, which of the following factors should be considered?

a) Energy efficiency of the pump system.

b) Use of environmentally friendly materials.

c) Proper disposal of waste materials.

d) All of the above..

4. Which of the following sustainability concepts can be applied during pump installation?

A. Installing a variable frequency drive (VFD) to optimize energy consumption.

B. Reusing materials from previous installations.

C. Employing water-saving measures.

D. All of the above..

5. How can sustainability be promoted in pump installation projects?

A. By using renewable energy sources to power the pumps.

B. By implementing preventive maintenance programs to prolong pump lifespan.

C. By educating project stakeholders about the importance of sustainability.

D All of the above.

Part-II: Say true for right statement and false for wrong one

1: The pump should be located as close to the water source as possible.

2: It is important to inspect the site before installing the pump to ensure that it is a suitable location.

3: When identifying, ordering and collecting materials and equipment for the pump installation, it is important to consider sustainability principles and concepts.

4: One way to apply sustainability principles and concepts to the pump installation is to choose a pump that is energy efficient.

5: Another way to apply sustainability principles and concepts to the pump installation is to choose materials that are recycled or recyclable.

Part-III: Answer the following questions accordingly

1: What are two things to consider when choosing a location for a pump?

2: What are two ways to apply sustainability principles and concepts to the installation of a pump?

Operation Sheet: 1

Operation title: Pump Location Identification

Purpose:

- Identify and evaluate potential locations for the installation of a pump.

Instruction:

- Use given tools and equipment to Identify and evaluate potential location of water pump systems. For this operation you have given 2 Hour.

Precautions:-

- Wear appropriate safe clothes
- Ensure the work site hazard free
- Ensure the working area is bright / good visibility
- Make workstation comfortable

Tools and requirement:

- Measuring tape
- Notepad or electronic device for note-taking
- Camera or Smartphone for documenting potential locations
- Safety equipment (as required by the site)

Procedures

1. Site Survey:
   a. Visit the project site and familiarize yourself with the surroundings.
   b. Take note of the water source and the destination where the water will be pumped.
   c. Observe any existing infrastructure, such as wells, storage tanks, or water bodies.
2. Evaluate Water Source:
   a. Identify the primary water source, whether it is a well, river, reservoir, or other.
   b. Note the elevation and distance between the water source and the intended pump location.

c. Consider the type and quality of water available at the source.

3. Assess Accessibility:
   a. Determine the accessibility of potential pump locations.
   b. Consider factors such as clearance space, ease of installation, and maintenance access.
   c. Verify the availability of utilities like electricity for powering the pump.
4. Noise and Vibration Considerations:
   a. Evaluate the sensitivity of the surrounding areas to noise and vibrations.
   b. Identify any nearby residential or commercial buildings, noise-sensitive areas, or equipment that may be affected by pump operation.
   c. Consider measures to minimize noise and vibration impact, such as isolation pads or enclosures.
5. Ventilation and Heat Dissipation:
   a. Assess the ventilation options for potential pump locations.
   b. Ensure adequate airflow to prevent overheating of the pump.
   c. Avoid enclosing the pump in confined spaces without proper ventilation.
6. Elevation and Gravity:
   a. Determine the elevation difference between the water source and the destination.
   b. Ideally, position the pump at a lower elevation than the water source to maximize the benefits of gravity flow.
   c. Consider the required pumping head and the impact of elevation on pump performance.
7. Evaluate Pipe Routing:
   a. Determine the optimal path for the discharge piping from the pump location to the destination.
   b. Minimize bends, restrictions, and excessive lengths to avoid pressure losses.
   c. Consider the available space for pipe routing and any obstacles that may need to be addressed.
8. Consider Environmental Factors:
   a. Evaluate the environmental conditions surrounding potential pump locations.
   b. Avoid areas prone to flooding, excessive moisture, extreme temperatures, or corrosive substances that could impact pump performance or longevity.

c. Ensure compliance with any environmental regulations or guidelines.

9. Structural Support:
   a. Assess the structural integrity of potential pump locations.
   b. Ensure that the chosen location can provide a stable and secure foundation or mounting surface for the pump.
   c. Consider the weight and vibrations generated by the pump during operation.
10. Document and Evaluate:
   a. Take clear photographs or make sketches of potential pump locations.
   b. Record key observations, measurements, and notes for each location.
   c. Evaluate the pros and cons of each location based on the factors assessed.

Quality criteria:-Assured the performance of all the activities that Installing fire hose real systems according to the given guide.

LAP Test

Instructions: Instructions: Perform the following activity as required standard

Task 1: Prepare necessary tools and materials for your work

Task 2: Identify and evaluate potential locations for the installation of a pump

Task 3: Finalize your work

Unit3. Install water pump sets

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Setting out and Construct pump base
- Installing pump and pump controls
- Conducting pressure testing piping system
- Testing and recording pump set

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify Set out and Construct pump bas
- Understand Install pump and pump controls
- Identify Conduct pressure test piping system
- Identify test and recording pump set

3.1Setting out and Construct pump base

Setting out and constructing a pump base is a crucial step in the installation of a water pump or any other machinery requiring a stable foundation? A well-constructed pump base provides support, stability, and alignment for the pump, ensuring its proper operation. Here are the key steps involved in setting out and constructing a pump base:

1. **Site Preparation:** Select a suitable location for the pump base, considering factors such as proximity to the water source, electrical connections, and access for maintenanceClear the area of any debris, vegetation, or obstacles that may interfere with the construction.
2. **Design and Layout:** Design the pump base according to the specifications of the pump and the manufacturer's recommendations. The design should include dimensions, load-bearing capacity, and alignment requirements. Use layout tools, such as tape measures, levels, and string lines, to mark the outline of the pump base on the ground.
3. **Excavation:** Excavate the marked area to the required depth and dimensions. The depth of the excavation depends on the type and size of the pump and the foundation requirements. Ensure that the bottom of the excavation is level and properly compacted.
4. **Base Material:** Place a layer of suitable base material, such as gravel or crushed stone, in the excavation. This material helps to provide a stable and level surface for the concrete foundation.
5. **Formwork:** Construct formwork or molds around the perimeter of the pump base area. The formwork should be properly aligned and leveled, ensuring that it matches the planned dimensions.
6. **Reinforcement:** If required, install reinforcement, such as rebar or wire mesh, within the formwork to enhance the strength of the concrete foundation. The type and amount of reinforcement should be in accordance with the design specifications.

7. **Concrete Pouring:** Mix and pour concrete into the formwork, filling the space to the top. Consolidate the concrete by using a vibrator or by tamping to remove air voids.Level the surface of the concrete to match the desired finish, and ensure that it aligns with the layout.
8. **Curing and Finishing:** Cover the freshly poured concrete with curing compounds or wet burlap to prevent rapid drying and to promote proper curing for several days. Finish the surface as needed, which may include toweling for a smooth finish or leaving it rough for better adhesion.
9. **Setting the Pump:** Once the concrete has cured and achieved the necessary strength, install the pump on the base, aligning it properly with the designated connections.
10. **Grouting and Anchoring:** - Depending on the pump type, secure it to the base using grout or anchor bolts to prevent movement and vibration.

11.Site Cleanup: Remove any excess materials and clean the site after completing the installation. Properly setting out and constructing a pump base is critical to the pump's performance and longevity. It ensures stability and alignment, reduces the risk of structural issues, and allows for efficient maintenance and servicing of the pump. Following manufacturer recommendations and industry standards is essential to achieve a reliable and durable pump base.

3.2 Installing pump and pump controls

The installation of a pump and pump controls is a critical step in the setup of a water pump system. Proper installation ensures the pump functions efficiently and reliably. Below are the key steps involved in installing a pump and its controls:

1. **Location and Positioning:** Select a suitable location for the pump based on the system's requirements, proximity to the water source, and access for maintenance. Position the pump on its designated base, aligning it properly with the water source, piping, and discharge outlet.
2. **Secure Mounting:** Ensure that the pump is securely mounted on its base or foundation to prevent movement or vibration during operation. If required, use anchor bolts or grout to secure the pump in place.
3. **Electrical Connection:** Connect the pump to the electrical power supply in compliance with local electrical codes and regulations. Ensure that the electrical connections are properly

insulated and protected from environmental factors.

4. **Plumbing Connection:** Connect the pump to the water supply and distribution system using suitable piping, valves, and fittings. Ensure that all connections are watertight and leak-free.
5. **Suction and Discharge Piping:** Connect the pump's suction and discharge piping to the corresponding inlet and outlet connections. Ensure that the piping is properly sized and supported to prevent strain on the pump.
6. **Priming:** If the pump is not self-priming, follow the manufacturer's instructions for priming the pump. This may involve filling the pump and suction piping with water to remove air and create suction.
7. **Controls and Sensors:** Install any required controls and sensors, such as pressure switches, level sensors, or flow meters, as part of the pump control system. Connect these controls to the pump and electrical panel.
8. **Wiring and Control Panel:** Wire the controls to the electrical control panel. The control panel may include circuit breakers, contactors, relays, and control components. Ensure proper labeling and organization of the wiring for easy troubleshooting and maintenance.
9. **Test Run:** Perform a test run of the pump to ensure it operates as expected. Verify that the controls and sensors are functioning correctly.Monitor the system for any issues, leaks, or abnormal behavior during the test run.
10. **Adjustments and Calibration:** - Calibrate and adjust the control settings as needed to achieve the desired performance, such as pressure or flow rate. - Make any necessary adjustments to meet the specific requirements of the application.
11. **Safety Measures:** - Implement safety measures, such as guards and safety switches, to protect personnel from moving parts or electrical hazards.
12. **Documentation:** - Maintain accurate records of the pump installation, including wiring diagrams, control settings, and any system testing results.
13. **Training:** - Provide training to personnel responsible for operating and maintaining the pump system, emphasizing safety and proper procedures.
14. **Site Cleanup:** - After completing the installation, clean the site and remove any debris, tools,

and materials.

Proper installation of a pump and its controls is essential to ensure the reliable and efficient operation of the water pumping system. Following manufacturer recommendations, industry best practices, and safety guidelines is critical for a successful pump installation.

3.3 Conducting pressure testing piping system

Conducting pressure testing on a piping system is an important step in ensuring the system's integrity, safety, and functionality. Pressure testing is typically performed to identify leaks, verify the system's capacity to handle pressure, and confirm that the system is ready for its intended purpose. Here's a general overview of how to conduct pressure testing on a piping system:

1. **Inspection and Preparation:** Inspect the entire piping system to ensure that all connections, joints, and components are properly installed and tightened.

   Verify that any necessary safety measures are in place, such as access to shut-off valves, eye wash stations, and safety equipment for personnel.

2. **Select Testing Method:** Determine the appropriate pressure testing method based on the system's requirements and specifications. Common methods include hydrostatic testing (using water) and pneumatic testing (using compressed air or inert gases).

3. **Establish Test Pressure:** Determine the test pressure based on the design specifications and applicable codes and standards. The test pressure should typically exceed the system's maximum operating pressure to provide a safety margin.

4. **Isolate the System:** Ensure that the section of the piping system to be tested is isolated from the rest of the system to prevent overpressure or contamination. This is typically done using shut-off valves or blinds.

5. **Fill the System:** For hydrostatic testing, gradually fill the isolated section with water until it reaches the specified test pressure. Use a pump or other suitable means to control the pressure increase.

6. **Monitor for Leaks:** Carefully monitor the system for any signs of leaks. Leaks can be identified through visual inspection, the use of soap solutions to detect bubbles, or pressure

drop measurements. Pay special attention to joints, connections, and vulnerable areas.

7. **Hold and Stabilize Pressure:** Once the test pressure is achieved, maintain the pressure for a specified duration, usually for a set period to check for any pressure loss. Stabilize the pressure to ensure that the system does not exhibit excessive pressure drop.
8. **Record Results:** Keep detailed records of the pressure testing process, including the start and end times, test pressure, any observed leaks, and any corrective actions taken.
9. **Release Pressure:** Gradually release the test pressure from the system after the testing period is completed.
10. **Remediation and Re-Testing:** - If leaks or issues are identified during the pressure test, address and repair them as needed. - Re-test the section after repairs to ensure that the issues have been resolved.
11. **Approval and Certification:** - If the system passes the pressure test and no issues are identified, it is typically approved for operation. - Provide certification and documentation to confirm that the pressure test has been successfully conducted.
12. **Dispose of Test Fluid:** - Properly dispose of the test fluid (water or gas) according to environmental regulations and local guidelines.

Pressure testing is a crucial quality control step in the construction and maintenance of piping systems to ensure safety and reliability. It is essential to adhere to industry standards and safety precautions when conducting pressure testing on any piping system.

3.4 Testing and recording pump set

Testing and recording a pump set involves verifying the performance of the installed pump and its associated components. This step is essential to ensure that the pump functions as expected and meets the specified requirements.

Conduct testing and record the pump set:

1. Visual Inspection: Begin by visually inspecting the entire pump set, including the pump, motor, controls, piping, and electrical connections. Verify that all components are properly installed, aligned, and secured.

2. Pre-Startup Checks: Perform pre-startup checks, including verifying that the pump and motor rotation match, that the pump is properly lubricated, and that all safety measures are in place.

3. Electrical Checks: Ensure that the electrical connections are correctly wired and that the control panel is functioning as intended. Verify the control settings and safety interlocks.

4. Prime the Pump: If the pump is not self-priming, ensure that it is properly primed with water to eliminate air from the system.

5. Startup and Operation: Start the pump and monitor its operation. Observe any unusual noises, vibrations, or temperature fluctuations. Pay close attention to the initial load and performance.

6. Performance Testing: Measure the pump's performance parameters, which may include flow rate (GPM or LPM), head (pressure), and efficiency.Compare the measured values to the design specifications to verify that the pump is operating within the desired range.

7. Pressure Testing: If the pump is part of a pressurized system, conduct pressure testing to ensure that the system can maintain the required pressure under load.

8. Flow Testing: Measure and record the flow rate of water through the system, which is essential for applications such as irrigation or water distribution.

9. Efficiency Testing: Calculate the pump's efficiency by comparing the input power (electrical consumption) to the output power (measured work done by the pump).

A higher efficiency indicates better energy utilization.

10. Run Test Duration: - Run the pump for a sufficient duration to verify its continuous and stable operation. This may involve several hours of continuous operation.

11. Leakage and Sealing Checks: - Inspect for any leaks at connections, seals, and gaskets. Address any issues promptly.

12. Recording Test Data: - Maintain a detailed record of all test data, including startup time, pressure, flow rate, power consumption, temperature, and any observations or issues.

13. Adjustment and Calibration: - Make any necessary adjustments or calibration to the pump

or its controls to optimize performance.

14. Remediation: - If any issues or discrepancies are identified during testing, take appropriate corrective actions, such as repairs or adjustments.

15. Re-Testing: - After remediation, re-test the pump to confirm that the issues have been resolved and that the pump meets the required specifications.

16. Documentation and Certification: - Provide certification and documentation confirming that the pump set has been successfully tested and is ready for operation.

Conducting thorough testing and recording the results is essential to ensure the reliability and performance of the pump set. The recorded data serves as a reference for future maintenance and troubleshooting, helping to maintain the system's efficiency and functionality.

Self-check-3

Part-I: Choose the correct answer.

1. Which of the following is the correct order for installing a pump set?

A. Installing pump and pump controls, setting out and constructing pump base, conducting pressure testing piping system, testing and recording pump set

B. Setting out and constructing pump base, installing pump and pump controls, conducting pressure testing piping system, testing and recording pump set

C. Conducting pressure testing piping system, setting out and constructing pump base, installing pump and pump controls, testing and recording pump set

D. Testing and recording pump set, setting out and constructing pump base, installing pump and pump controls, conducting pressure testing piping system

2. Which of the following is NOT a component of a pump set?

A. Pump

B. Motor

C. Base plate

D. Piping

3. Which of the following is the purpose of pressure testing a piping system?

A. To ensure that the system can withstand the operating pressure

B. To identify any leaks in the system

C. To flush out any debris in the system

D. All of the above

Answer: D

Part-II: Say true for right statement and false for wrong one

1. The pump base should be set out and constructed before the pump and pump controls are installed.

2: The piping system should be pressure tested before the pump is tested

3: The pump set should be tested and recorded before it is put into operation.

Part-III: Answer the following questions accordingly.

1. What are the key considerations when setting out and constructing a pump base?
2. What are the main steps involved in testing and recording a pump set?

Operation Sheet: 2

Operation title: Pump Set Installation

Purpose: To guide the systematic installation of a pump set

Instruction:

- Use given tools and equipment to install water pump systems. For this operation you have given 3 Hour.

Precautions:-

- ✓ Wear appropriate safe clothes
- ✓ Ensure the work site hazard free
- ✓ Ensure the working area is bright / good visibility
- ✓ Make workstation comfortable

Tools and requirement:

- Pump set and associated components
- Wrenches (adjustable and pipe wrenches)
- Screwdrivers (flathead and Phillips)
- Pipe cutter
- Pipe threader (if required)
- Teflon tape
- Pressure gauge
- Power drill
- Measuring tape
- Hacksaw
- Pipe supports (brackets or hangers)
- Pipe sealant or thread compound
- Gaskets and O-rings
- Mounting hardware (bolts, nuts, washers)
- Electrical wiring and connectors
- Lubricants and grease
- Safety equipment (as required by the site)

Procedures

1. Safety Precautions:
   a. Assess the work area for any potential hazards and implement necessary safety measures.
   b. Ensure the availability and proper use of personal protective equipment (PPE) for all

personnel involved in the installation.

c. Review and adhere to relevant safety guidelines and regulations.

2. Pump Set Inspection:

a. Inspect the pump set and associated components for any visible damage or defects.

b. Verify that all required components and accessories are present and in working condition.

c. Ensure compatibility between the pump set and the designated installation location.

3. Installation Planning:

a. Review the installation requirements and specifications provided by the manufacturer.

b. Develop a comprehensive installation plan, considering factors such as pump location, pipe routing, electrical connections, and mounting arrangements.

4. Prepare the Installation Area:

a. Clear the designated installation area of any obstructions or debris.

b. Ensure a clean and level surface for the pump set to sit on.

c. Install any necessary mounting brackets or supports according to the manufacturer's instructions.

5. Pipe Installation:

a. Measure and cut the pipes to the required lengths using a pipe cutter.

b. Thread the pipe ends if necessary, using a pipe threader.

c. Apply Teflon tape or pipe sealant to the threaded connections to ensure a proper seal.

d. Assemble and connect the pipes, fittings, and valves according to the installation plan.

6. Pump Set Installation:

a. Position the pump set securely on the designated mounting surface.

b. Use mounting hardware (bolts, nuts, washers) to secure the pump set in place.

c. Align the pump set with the connected pipes, ensuring proper alignment and support.

7. Electrical Connections:

a. Connect the pump motor to the power source according to electrical wiring requirements.

b. Follow proper wiring techniques, ensuring the correct wire sizes, connectors, and grounding.

c. Test the electrical connections for proper functionality and safety.

8. Testing and Commissioning:
   a. Fill the pump system with water, ensuring all valves are in the correct position.
   b. Energize the pump motor and monitor the system for proper operation.
   c. Check for any leaks, abnormal noises, or vibrations.
   d. Measure and record system pressure using a pressure gauge.
   e. Verify that the pump set is delivering the required flow rate and pressure.
9. Documentation and Handover:
   a. Document the completed installation, including photographs, diagrams, and relevant measurements.
   b. Prepare a detailed report or checklist outlining the installation steps and any observations or recommendations.
   c. Conduct a final inspection to ensure all components are installed correctly and meet the desired specifications.
   d. Hand over the installed pump set to the relevant personnel or authorities, if applicable.

Quality criteria:-Assured the performance of all the activities that Installing fire hose real systems according to the given guide.

LAP Test

Instructions: Perform the following activity as required standard

Task 1: Collect necessary material and equipment for your work..

Task 2: Perform pump set installation

Task 3: Maintain and store pump tools and equipment's

Task 4: Finalize your work

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