



# Model Curriculum

**QP Name: Water Pump Operator**

**QP Code: PSC/Q0118**

**QP Version: 1.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

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# Training Parameters

<b>Sector</b>	PLUMBING
<b>Sub-Sector</b>	Industrial / Non-Industrial Plumbing (As per NBC 2016 Classification)
<b>Occupation</b>	Plumbing Systems Installation and Maintenance
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7126.0101
<b>Minimum Educational Qualification and Experience</b>	8th Class+ I.T.I (Plumbing) with 2 Years of relevant experience OR 10th Class with 2 Years of relevant experience OR 12th Class Pass OR 8th Class+ NSQF Level-3 Certification (Assistant Plumber-General) with 2 Years of relevant experience.
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	20 years
<b>Last Reviewed On</b>	24/02/2022
<b>Next Review Date</b>	24/02/2026
<b>NSQC Approval Date</b>	
<b>QP Version</b>	1.0
<b>Model Curriculum Creation Date</b>	12/01/2022
<b>Model Curriculum Valid Up to Date</b>	24/02/2026
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	420 Hours
<b>Maximum Duration of the Course</b>	420 Hours

## Program Overview

This section summarizes the end objectives of the program along with its duration.

### Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Install pump systems and related equipment
- Operate and maintain pumping machinery
- Perform maintenance of local ground water source and water quality monitoring at water supply stations
- Maintain of water distribution and storage systems at water supply stations
- Operate and maintain water treatment units
- Adhere to health and safety practices at the workplace
- Work in an effective manner
- Demonstrate practices for optimizing resource utilization at the workplace

### Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>	<b>03:00 Hours</b>	<b>00:00 Hours</b>	<b>00:00 Hours</b>	<b>00:00 Hours</b>	<b>03:00 Hours</b>
Module 1: Introduction to the sector and the job role	03:00 Hours	00:00 Hours	00:00 Hours	00:00 Hours	03:00 Hours
<b>PSC/N0151: Install Pump Systems and Related Equipment</b> <b>NOS Version No.: 1.0</b> <b>NSQF Level: 4</b>	<b>12:00 Hours</b>	<b>25:00 Hours</b>	<b>10:00 Hours</b>	<b>00:00 Hours</b>	<b>47:00 Hours</b>
Module 2: Basics of Water pumps	04:00 Hours	00:00 Hours	02:00 Hours	00:00 Hours	06:00 Hours
Module 3: Installing pump systems and related equipment	08:00 Hours	25:00 Hours	08:00 Hours	00:00 Hours	41:00 Hours
<b>PSC/N0152: Operate and Maintain Pumps and Related Machinery</b> <b>NOS Version No.: 1.0</b> <b>NSQF Level: 4</b>	<b>16:00 Hours</b>	<b>48:00 Hours</b>	<b>20:00 Hours</b>	<b>00:00 Hours</b>	<b>84:00 Hours</b>
Module 4: Operating pumping machinery	08:00 Hours	24:00 Hours	10:00 Hours	00:00 Hours	42:00 Hours

Module 5: Pumping machinery maintenance	08:00 Hours	24:00 Hours	10:00 Hours	00:00 Hours	42:00 Hours
<b>PSC/N0153: Perform Maintenance of Local Ground Water Source and Water Quality Monitoring at Water Supply Stations NOS Version No.: 1.0 NSQF Level: 4</b>	<b>20:00 Hours</b>	<b>45:00 Hours</b>	<b>30:00 Hours</b>	<b>00:00 Hours</b>	<b>95:00 Hours</b>
Module 6: Dug well maintenance	04:00 Hours	09:00 Hours	06:00 Hours	00:00 Hours	19:00 Hours
Module 7: Hand pump maintenance	04:00 Hours	09:00 Hours	06:00 Hours	00:00 Hours	19:00 Hours
Module 8: Tube well and bore well maintenance	04:00 Hours	09:00 Hours	06:00 Hours	00:00 Hours	19:00 Hours
Module 9: Spring and surface water source maintenance	04:00 Hours	09:00 Hours	06:00 Hours	00:00 Hours	19:00 Hours
Module 10: Monitoring water quality	04:00 Hours	09:00 Hours	06:00 Hours	00:00 Hours	19:00 Hours
<b>PSC/N0154: Maintain of water distribution and storage systems at water supply stations NOS Version No.: 1.0 NSQF Level: 4</b>	<b>12:00 Hours</b>	<b>32:00 Hours</b>	<b>10:00 Hours</b>	<b>00:00 Hours</b>	<b>54:00 Hours</b>
Module 11: Sump and storage tanks maintenance	03:00 Hours	08:00 Hours	03:00 Hours	00:00 Hours	14:00 Hours
Module 12: Water meter maintenance	03:00 Hours	08:00 Hours	03:00 Hours	00:00 Hours	14:00 Hours
Module 13: Flow meter monitoring and maintenance	03:00 Hours	08:00 Hours	02:00 Hours	00:00 Hours	13:00 Hours
Module 14: Pipelines operation, maintenance and repair	03:00 Hours	08:00 Hours	02:00 Hours	00:00 Hours	13:00 Hours
<b>PSC/N0155: Operate and maintain water treatment units NOS Version No.: 1.0 NSQF Level: 4</b>	<b>08:00 Hours</b>	<b>22:00 Hours</b>	<b>10:00 Hours</b>	<b>00:00 Hours</b>	<b>40:00 Hours</b>
Module 15: Operation and maintenance of water treatment units	08:00 Hours	22:00 Hours	10:00 Hours	00:00 Hours	40:00 Hours

<b>PSC/N0136: Apply health and safety practices at the workplace NOS Version No.: 1.0 NSQF Level: 4</b>	<b>06:00 Hours</b>	<b>24:00 Hours</b>	<b>06:00 Hours</b>	<b>00:00 Hours</b>	<b>38:00 Hours</b>
Module 16: Health and safety	06:00 Hours	24:00 Hours	06:00 Hours	00:00 Hours	38:00 Hours
<b>PSC/N0137: Work effectively with others NOS Version No.: 1.0 NSQF Level: 4</b>	<b>06:00 Hours</b>	<b>24:00 Hours</b>	<b>02:00 Hours</b>	<b>00:00 Hours</b>	<b>34:00 Hours</b>
Module 17: Working effectively	06:00 Hours	24:00 Hours	02:00 Hours	00:00 Hours	34:00 Hours
<b>SGJ/N1702 Optimize resource utilization at workplace NOS Version No.: 1.0 NSQF Level: 3</b>	<b>07:00 Hours</b>	<b>20:00 Hours</b>	<b>02:00 Hours</b>	<b>00:00 Hours</b>	<b>29:00 Hours</b>
Module 18: Optimum utilization of resources	07:00 Hours	20:00 Hours	02:00 Hours	00:00 Hours	29:00 Hours
<b>Total Duration</b>	<b>90:00 Hours</b>	<b>240:00 Hours</b>	<b>90:00 Hours</b>	<b>00:00 Hours</b>	<b>420:00 Hours</b>

# Module Details

## Module 1: Introduction to the sector and the job role

### Bridge Module

#### Terminal Outcomes:

- Explain the importance of plumbing industry.
- List the key responsibilities of a water pump operator.

<b>Duration:</b> 03:00	<b>Duration:</b> 00:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Outline the overview of the plumbing industry.</li> <li>• Discuss the scope of employment in the contracting segment of the industry.</li> <li>• List the key responsibilities of a water pump operator.</li> </ul>	
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Nil	

## Module 2: Basics of water pumps

Mapped to PSC/N0151, v 1.0

### Terminal Outcomes:

- List the processes conducted at the plumbing work site.
- Identify the various plumbing related materials, tools and equipment.

Duration: 04:00	Duration: 00:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• List the various types of pumps used in residential, agricultural and commercial setups.</li> <li>• Describe the performance measures, applications and properties of water pumps.</li> <li>• Interpret the common terminologies used in pump systems.</li> <li>• Identify the various components of pump systems and related equipment.</li> </ul>	
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Various types of pumps used in residential, agricultural and commercial setups	



## Module 3: Installing pump systems and related equipment

Mapped to PSC/N0151, v 1.0

### Terminal Outcomes:

- Prepare of installation.
- Install water pump and related equipment.
- Check the installation.

Duration: 08:00	Duration: 25:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• List the preparatory requirements for pump system installation.</li> <li>• List the tools and materials used in pump installation.</li> <li>• State the units of measurements used during the preparation, installation and checking of water pumps.</li> <li>• State the steps involved in calculating material requirements.</li> <li>• State the types of water supply and their implication on pumping system.</li> <li>• Explain the importance of referring to the manufacturers' specifications and standard Operating Procedures (SOPs) related to the installation and fitting of pumps.</li> <li>• Describe the procedure of installing water pumps.</li> <li>• State some common dos and don'ts of various pumping systems.</li> <li>• Explain the importance of ensuring prevention of any contact of water and electrical connections with each other during the process.</li> <li>• Describe levelling and alignment procedures.</li> <li>• List the different types of pumping apparatus (reciprocating, rotary etc.) and associated equipment and purposes.</li> <li>• List the basic fittings (valves, clamps, elbows, etc.) in the pumping apparatus.</li> <li>• List the gauges, dials, monitoring apparatus and their purpose.</li> <li>• List the different types of valves and their functioning (stop valve, non-return valve, etc.)</li> <li>• State the importance of working as per the standards, policies, and procedures followed in the company relevant to employment and performance conditions.</li> </ul>	<ul style="list-style-type: none"> <li>• Assemble pump components and equipment.</li> <li>• Prepare the tools, area and materials for the task.</li> <li>• Locate and mark position for inlet and outlet supply connections of pump.</li> <li>• Fix the pump at the designated location as per instruction.</li> <li>• Connect the hoses of inlet and outlet supply to the pump.</li> <li>• Make provisions for electrical and other required connections.</li> <li>• Install and connect pump components without any damage to pump, fixture, pipe work, the surrounding environment, or to other services.</li> <li>• Adjust pressure/flow as per required supply and demand.</li> <li>• Check installed pump systems for correct functioning and compliance with specifications.</li> <li>• Check for cracks, defects and anomalies in the pumping apparatus.</li> <li>• Check for condition of couplings in the equipment and pumping on both suction and discharge sides.</li> <li>• Check the oil level, fuel level, radiator coolant and engine condition of a diesel operated pump.</li> <li>• Check air release valve and prime the pump.</li> </ul>

- Describe the material disposal procedure to be applied after installation and its importance.
- Describe the process for condition monitoring of the equipment.
- Explain the importance of adhering to workplace safety requirements, hazard reporting and handling procedures during installation and checking of water motor pump systems and related equipment.

#### **Classroom Aids:**

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

#### **Tools, Equipment and Other Requirements**

pumping apparatus (centrifugal, reciprocating, rotary etc.); basic fittings (valves, clamps, elbows, etc.); tools and materials used in pump installation.

## Module 4: Operating pumping machinery

Mapped to PSC/N0152, v 1.0

### Terminal Outcomes:

- Perform operation of water pump.

<b>Duration:</b> 08:00	<b>Duration:</b> 24:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• List the key features of the various types of pump to be operated.</li> <li>• Describe different types of operation and maintenance schedules.</li> <li>• Explain the importance of preparing and following a schedule for pump operation and maintenance.</li> <li>• List the factors to be considered for preparing an operation and maintenance schedule.</li> <li>• Explain the need for standby pumps.</li> <li>• Describe how to improve output gain from the pump.</li> <li>• Explain the need and process for avoiding overloading and sudden change of water pressure.</li> <li>• Describe the function and operation of various valves such as bypass valves of reflux valve, sluice valve and butterfly valve during operation of the pumps.</li> <li>• Describe the factors that effect the efficiency of the pump such as voltage, current, location, starting load, etc.</li> <li>• Identify common sounds, vibrations, temperature and other related parameters that can change during the operation of the pump and their significance.</li> <li>• Explain the impact of various physical parameters like temperature, pressure, etc on the properties of final output.</li> <li>• Describe various input/output parameters of the pump for various types of requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to prepare a schedule for running the main pumps and the standby.</li> <li>• Demonstrate how to prime the centrifugal pump before start of operation.</li> <li>• Demonstrate measures that can be taken to ensure operation of the pump with full efficiency to improve output gain.</li> <li>• Demonstrate how to operate the delivery valve effectively to avoid overloading and sudden change of water pressure.</li> <li>• Close bypass valves of reflux valve, sluice valve and butterfly valve during normal operation of the pumps.</li> <li>• Demonstrate the monitoring of sound, vibration, temperature and other related parameters to ensure that the pump is operating smoothly.</li> <li>• Demonstrate how to maintain input/output parameters for the pump as per requirements.</li> <li>• Check pump motor alignment.</li> <li>• Demonstrate the defined action to be taken in case of overload/under load when the load parameters are above/below the specified limits.</li> <li>• Demonstrate the maintenance of a record of all pump operation timings, voltage, current, reading on gauges and flow meter, temperature, water level and any problem that occurred during the operation.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
centrifugal pump, basic fittings (valves, clamps, elbows, etc.); tools and materials used in pump operation.	

## Module 5: Maintain pumping machinery

Mapped to PSC/N0152, v 1.0

### Terminal Outcomes:

- Perform maintenance for the water pump and related machinery.

Duration: 08:00	Duration: 24:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>Explain the importance of preparing and following a schedule for pump maintenance</li> <li>Describe the factors to be considered for preparing a maintenance schedule.</li> <li>Explain the purpose and procedure for checking pump motor alignment.</li> <li>Explain normal load parameters and indicators of overload/underload.</li> <li>State the action to be taken in case of overload/underload.</li> <li>Explain the importance of maintaining a record of pump operation timings, voltage, current, reading on gauges and flow meter, temperature, water level and any problem that occurred during the operation.</li> <li>Explain the importance of preventive maintenance.</li> <li>List the various preventive maintenance tasks to be performed daily, monthly, quarterly, bi-annually and annually.</li> <li>Explain the considerations to be taken while making a preventive maintenance schedule.</li> <li>State the dos and don'ts while cleaning the pump, related machinery, pump chamber filter beds, other structures and the area.</li> <li>Explain the importance of regular inspections of the pump, related machinery and water supply system.</li> <li>Identify common indicators of faults, leaks, sparks, improper functioning, wear and tear or tampering in a pump and related machinery.</li> <li>Explain the importance of timely recording and reporting of faults, leaks, sparks, improper functioning, water supply complaints and tampering.</li> <li>Describe appropriate oil levels and procedure to check it.</li> <li>State the action to be taken if motor is sparking or parts are leaking or worn out.</li> <li>Describe the procedure to check and rectify alignment of pump and drive.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate the preparation of a monthly, quarterly, bi-annual and annual preventive maintenance schedule</li> <li>Demonstrate how to clean the pump, related machinery, pump chamber filter beds, other structures and the area.</li> <li>Inspect the pump, related machinery and water supply system for faults, leaks, sparks, improper functioning, wear and tear or evidence of tampering.</li> <li>Demonstrate how to record and report the faults, leaks, sparks, improper functioning, water supply complaints and tampering.</li> <li>Apply appropriate oil where oil levels are low as per standard</li> <li>Repair or replace sparking motor and leaking or worn out parts</li> <li>Check and rectify alignment of pump and drive.</li> <li>Tighten the foundation bolts and holding down bolts of pump and motor mounting.</li> <li>Calibrate all vital instruments such as pressure gauge, vacuum gauge, ammeter, voltmeter, watt meters, frequency meter, tachometer and flow meter.</li> <li>Conduct performance test of the pump for discharge, head and efficiency</li> <li>Demonstrate how to troubleshoot faults as per standard operating procedure.</li> </ul>

- List the various bolts to be tightened.
- Describe the calibration procedure of all vital instruments such as pressure gauge, vacuum gauge, ammeter, voltmeter, watt meters, frequency meter, tachometer and flow meter.
- Describe the performance testing procedure of the pump for discharge, head and efficiency.
- State the action to be taken for common faults.

#### **Classroom Aids:**

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

#### **Tools, Equipment and Other Requirements**

centrifugal pump, basic fittings (valves, clamps, elbows, etc.); tools and materials used in pump operation.

## Module 6: Dug well maintenance

Mapped to PSC/N0153, v 1.0

### Terminal Outcomes:

- Perform the maintenance of dug wells.

<b>Duration:</b> 04:00	<b>Duration:</b> 09:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe various ground water sources.</li> <li>• Describe the structure and use of dug well.</li> <li>• Explain the maintenance activities performed for a dug well and their importance.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the concrete apron and debris in the well.</li> <li>• Check the concrete apron and well seal for cracks and repair with cement mortar as needed.</li> <li>• Check the condition of the rope, pulley, support posts, bucket and fence and repair or replace when needed.</li> <li>• Lubricate the pulley as needed with grease.</li> <li>• Record the water level with a rope scale.</li> <li>• Demonstrate the repair of structural damage to the well and surrounding structure.</li> <li>• Dewater the well and clean the bottom.</li> <li>• Inspect the well walls and lining and repair as needed.</li> <li>• Check the water level and deepen/de-silt the well especially in monsoon.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Dug well,	

## Module 7: Hand pump maintenance

Mapped to PSC/N0153, v 1.0

### Terminal Outcomes:

- Perform the maintenance of hand pump.

<b>Duration:</b> 04:00	<b>Duration:</b> 09:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Describe the structure and use of hand pump.</li> <li>Explain the maintenance activities performed for a hand pump and their importance.</li> <li>Explain the importance of adhering to standard operating procedure while troubleshooting hand pumps.</li> </ul>	<ul style="list-style-type: none"> <li>Check all the flange nuts and bolts, axle bolt, flange bolts and tighten as needed.</li> <li>Tighten the handle axle nut and lock nut.</li> <li>Verify whether hand pump is firm on its base and fix it if needed.</li> <li>Open the cover and clean inside the pump.</li> <li>Dismantle the hand pump for inspection/cleaning and reassemble after inspection.</li> <li>Check the chain anchor bolt for proper position and tighten if needed.</li> <li>Verify rusty patches, clean with a wire brush and apply anticorrosive paint.</li> <li>Verify the discharge of water.</li> <li>Verify the handle position and repair if needed.</li> <li>Verify whether guide bush, roller chain is not excessively worn out and replace if needed.</li> <li>Clean and de-calcify pump components.</li> <li>Demonstrate the action to be taken to troubleshoot faults occurring in the hand pump.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Hand Pump, tools for dismantling and repairing hand pumps (clamp, pipe wrench and spanners, hammers, screw drivers, etc)	

## Module 8: Tube well and bore well maintenance

Mapped to PSC/N0153, v 1.0

### Terminal Outcomes:

- Perform the maintenance of tube well and bore well.

<b>Duration:</b> 04:00	<b>Duration:</b> 09:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the structure and use of tube well and bore well.</li> <li>• Explain the maintenance activities performed for a tube well and bore well and their importance.</li> <li>• Explain the importance of adhering to standard operating procedure while troubleshooting tube wells and bore wells.</li> </ul>	<ul style="list-style-type: none"> <li>• Operate pump starter and isolation valve.</li> <li>• Check if readings on ammeter and voltmeter are normal – stop pump if electric motor is drawing too much current.</li> <li>• Verify whether adequate water is being delivered.</li> <li>• Clean the pump house.</li> <li>• Check for leaks in the rising main.</li> <li>• Remove the pump and rising main from the well and inspect.</li> <li>• Inspect pipes, electric cables, insulation between cables.</li> <li>• Demonstrate how to make records of servicing and maintenance in the logbook.</li> <li>• Re-cut corroded or damaged threads and replace badly corroded pipes.</li> <li>• De-silt borehole.</li> <li>• Demonstrate actions to be taken to troubleshoot common faults occurring in the tube or bore well.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Tube well; bore well; pump starter and isolation valve; ammeter and voltmeter; tools for de-silting bore wells, tools for re-cutting damaged threads.	



## Module 9: Spring and surface water source maintenance

Mapped to PSC/N0153, v 1.0

### Terminal Outcomes:

- Perform the maintenance of spring and surface water source.

<b>Duration:</b> 04:00	<b>Duration:</b> 09:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the maintenance activities to be performed for spring source and surface water source and their importance.</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the area is free from waste disposal and defecation.</li> <li>• Check there is no unwanted human intervention or animal intrusion.</li> <li>• Check intake for clogging and submergence.</li> <li>• Repair any small damages to the intake system.</li> <li>• Dewater and clean the bottom of the spring source.</li> <li>• Check the water level of the surface water source and de-silt as per requirement.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Spring, tools for dewatering and cleaning bottom of spring source.	

## Module 10: Monitoring water quality

Mapped to PSC/N0153, v 1.0

### Terminal Outcomes:

- Monitor water quality.

<b>Duration:</b> 04:00	<b>Duration:</b> 09:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the importance of water quality monitoring.</li> <li>• Describe water quality monitoring tasks.</li> <li>• Explain the importance of adhering to water sampling schedule as per standard operating procedure.</li> <li>• Explain how to share water quality test results with appropriate authorities and who are the authorities.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify a water sampling site representative to the source and in line with sampling guidelines.</li> <li>• Obtain water samples from dug well, hand pump, tube well and bore well for quality testing.</li> <li>• Test water quality using a field test kit.</li> <li>• Store and send samples for laboratory testing.</li> <li>• Interpret relevant information from water quality report.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
water quality field test kit	

## Module 11: Sump and storage tanks maintenance

Mapped to PSC/N0154, v 1.0

### Terminal Outcomes:

- Perform the steps involved in maintenance of sump and storage tanks.

<b>Duration:</b> 03:00	<b>Duration:</b> 08:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• State an overview of water distribution and storage systems at water supply stations.</li> <li>• Describe the operational and maintenance requirements and procedures for sump and storage tanks.</li> </ul>	<ul style="list-style-type: none"> <li>• Dewater sump and tank.</li> <li>• Clean, disinfect and rinse the sump and tank.</li> <li>• Desilt the area and pump house.</li> <li>• Perform leakage test and carry out rectification if needed with epoxy coating, cement concreting, painting etc.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
sump and tank; tools and materials for cleaning, disinfecting and rinsing sump and tank; tools for leakage test; tools and materials for epoxy coating, cement concreting, painting etc.	

## Module 12: Water meter maintenance

Mapped to PSC/N0154, v 1.0

### Terminal Outcomes:

- Perform the steps involved in maintenance of water meter.

<b>Duration:</b> 03:00	<b>Duration:</b> 08:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the operational and maintenance requirements and procedures for water meters.</li> <li>• State the importance of following standard operating procedures while troubleshooting faults.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the dirt box or strainer.</li> <li>• Replace gaskets upon its wear and tear.</li> <li>• Clean the chamber where meter is installed.</li> <li>• Apply standard measures to prevent water seepage into the water meter.</li> <li>• Verify if water meter is given correct reading.</li> <li>• Disassemble and reassemble the water meter for verification or repair.</li> <li>• Demonstrate actions to be taken to troubleshoot common faults in water meters.</li> <li>• Clean the disassembled parts.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Water meter, tools for disassemble, reassemble and repair water meter	

## Module 13: Flow meter monitoring and maintenance

Mapped to PSC/N0154, v 1.0

### Terminal Outcomes:

- Perform the steps involved in the monitoring and maintenance of flow meter.

<b>Duration:</b> 03:00	<b>Duration:</b> 08:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the operational and maintenance requirements and procedures for flow meters.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the range and zero setting of the flow meter.</li> <li>• Inspect for bearing wear out, deposits in flow meter or corrosion of attached pipes.</li> <li>• Demonstrate actions to be taken to troubleshoot common faults in flow meters.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Flow meter; tools for troubleshooting flow meters	

## Module 14: Pipelines operation, maintenance and repair

Mapped to PSC/N0154, v 1.0

### Terminal Outcomes:

- Perform the steps involved in the operation, maintenance and repair of pipelines.

<b>Duration:</b> 03:00	<b>Duration:</b> 08:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Describe operational and maintenance requirements and procedures for pipelines.</li> <li>Describe pipeline repair procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Operate water pipelines with positive pressure and by opening and shutting off the valves gradually.</li> <li>Flush the system to clear sediments.</li> <li>Service the valve chamber and valves.</li> <li>Inspect the pipelines for damage, wear and tear, leakage, entrainment and water hammer.</li> <li>Locate the leaks in the pipes.</li> <li>Replace faulty parts like gaskets, valves joints and pipes that are not repairable.</li> <li>Repair damaged pipelines.</li> <li>Apply cement mortar lining on corroded pipes.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Water pipelines; cement mortar; tools for repairing water pipelines	

## Module 15: Operation and maintenance of water treatment units

Mapped to PSC/N0155, v 1.0

### Terminal Outcomes:

- Perform the steps involved in the operation and maintenance of water treatment units.

<b>Duration: 08:00</b>	<b>Duration: 22:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Provide an overview of water treatment units.</li> <li>Describe commonly used water treatment units such as slow sand filters and chlorinators.</li> <li>Describe operational and maintenance requirements and procedures for water treatment units.</li> <li>Describe the process for starting and shutting off the filtration.</li> <li>Explain the concepts of rate of filtration and need for its adjustment.</li> <li>List the chemicals used in the water treatment units.</li> <li>Explain when and how to add chemicals, such as ammonia, chlorine, or lime, to disinfect water or other liquids.</li> <li>Explain the importance of regular inspection and the inspection process.</li> <li>Describe various meter and gauges and information to be gathered from them.</li> <li>Explain the importance and procedure of water and sewage testing.</li> <li>Explain the importance of maintaining records.</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Start and shut off the filtration process.</li> <li>Adjust the rate of filtration as needed.</li> <li>Add chemicals, such as ammonia, chlorine, or lime, to disinfect water or other liquids.</li> <li>Inspect equipment on a regular basis to ensure proper functioning and adherence to safety standards.</li> <li>Monitor operating conditions, meters, and gauges.</li> <li>Collect and test water and sewage samples.</li> <li>Take recordings of meter and gauge readings, and operational data.</li> <li>Operate equipment to purify and clarify water, or to process or dispose of sewage.</li> <li>Clean and maintain equipment, tanks, filter beds, and other work areas.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Water treatment unit; chemicals, such as ammonia, chlorine, or lime, to disinfect water or other liquids; water testing kit; tools and materials for cleaning and maintaining equipment, tanks, filter beds, and other work areas	

## Module 16: Health and safety

Mapped to PSC/N0136, v 1.0

### Terminal Outcomes:

- Describe the various risks and hazards at the workplace and their preventive and corrective measures
- Employ preventive and corrective measures to protect self and others from common workplace hazards and risk

<b>Duration: 06:00</b>	<b>Duration: 24:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Differentiate between risks and hazards. (KU4)</li> <li>• Discuss the specific safety and health related problems faced in domestic, commercial and institutional setups.</li> <li>• List the various types of hazards (such as physical, fire, chemical compounds and electrical) that could affect the work process.</li> <li>• List the various hazardous environments and common hazards that can occur during plumbing installation and maintenance along with their precautions and remedial measures.</li> <li>• Discuss the importance of various types of personal protective equipment (PPE).</li> <li>• Discuss where the general health and safety equipment commonly is kept at the workplace.</li> <li>• Explain the various types of safety signs and their significance in the work process.</li> <li>• Discuss various causes of fire and precautionary activities to prevent the fire accident.</li> <li>• List the different techniques that employ various methods (such as using extinguishers, water hose, sprinklers, sand bucket, wet blanket, etc.) and materials such as water, powder, foam, CO<sub>2</sub>, fire extinguishing chemical, sand, blanket, etc. used for extinguishing fire as per the type (as per class A, B, C and D).</li> <li>• Describe rescue techniques applied during a fire hazard or electrocution.</li> <li>• Discuss appropriate basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform inspection of a work area in order to identify risks and hazards. (PC1)</li> <li>• Apply various health and safety precautions to be taken during plumbing work.</li> <li>• Apply personal and workspace hygiene and sanitation practices.</li> <li>• Dramatize workplace emergency and evacuation procedures using role plays.</li> <li>• Demonstrate the correct use of fire extinguishers.</li> <li>• Dramatize, using role play, safe methods of freeing a person from electrocution.</li> <li>• Perform appropriate first aid treatment for various conditions such as bleeding, burns, choking, electric shock and poisoning and injury.</li> <li>• Demonstrate the process of providing cardiopulmonary resuscitation (CPR).</li> </ul>



- Discuss potential injuries and health problems associated with incorrect handling of tools and equipment.

#### **Classroom Aids:**

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

#### **Tools, Equipment and Other Requirements**

Personal protective equipment (such as eye protector, hard hats, safety belts, gloves, protective clothing), plumbing tools and materials, power tools, required machinery, fire extinguisher, first aid kit.

## Module 17: Working effectively with others

Mapped to PSC/N0137, v 1.0

### Terminal Outcomes:

- Apply effective communication techniques.
- Demonstrate teamwork and a positive attitude.
- Demonstrate responsible and disciplined behaviour.

Duration: 06:00	Duration: 24:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• State the importance of effective communication in the workplace.</li> <li>• List various people that one is required to communicate and coordinate with, in an organisation and their hierarchical relationship.</li> <li>• List various components of effective communication.</li> <li>• State the importance of using inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive.</li> <li>• State the importance of teamwork and developing effective working relationships for professional success.</li> <li>• Discuss the importance and ways of managing interpersonal conflict effectively.</li> <li>• Discuss how to express and address grievances appropriately and effectively.</li> <li>• State the importance of ethics and discipline for professional success.</li> <li>• Explain what constitutes disciplined behaviour and integrity for a working professional.</li> <li>• Discuss the legislation, standards, policies, and procedures relevant to own employment and performance conditions.</li> <li>• Discuss importance of dress code in organisations.</li> <li>• Explain the impact of gender, disability, cultural and age related biases, stereotyping at the workplace and in society.</li> <li>• List the different types of disabilities and the challenges faced by persons with disability (PwD).</li> <li>• State the laws, acts, provisions and schemes defined for PwD by the Government bodies.</li> <li>• Discuss gender, disability and cultural biases, stereotypes and impact on others.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate techniques used for ensuring timely receipt of complete information and instructions from appropriate sources.</li> <li>• Apply practices that improve effectiveness while providing information.</li> <li>• Demonstrate the use of inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive.</li> <li>• Illustrate the use of appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism.</li> <li>• Dramatise a situation to show effective team work.</li> <li>• Dramatize (through role-play) disciplined behaviours at the workplace.</li> <li>• Dramatize (through role-play) the process of escalation of grievances and problems.</li> <li>• Recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation and culture at workplace.</li> <li>• Demonstrate practices to eliminate personal bias based on gender, disability, caste, religion, colour, sexual orientation and culture from routine transactions.</li> </ul>

- Discuss basic gender concepts such as gender power relations, gender roles, access and control, gender sensitivity, gender equity and equality.
- Discuss the importance of gender sensitivity and equality.
- List the indicators of harassment and discrimination based on gender, disability, caste, religion or culture that occurs at a typical workplace.
- State general organisational norms and procedures applied to protect against harassment and discrimination.
- Discuss the importance of reporting incidents of harassment and discrimination to appropriate authority.

#### **Classroom Aids:**

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

#### **Tools, Equipment and Other Requirements**

Nil

## Module 18: Optimum utilisation of resources

Mapped to SGJ/N1702, v 1.0

### Terminal Outcomes:

- Use the material in an optimum way at work.
- Use energy/electricity optimally at work.
- Employ practices for minimization of waste generation.
- Demonstrate the process of waste disposal as per industry approved standards.

<b>Duration:</b> 07:00	<b>Duration:</b> 20:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss the practices and impact of inefficient utilization of material and water.</li> <li>• Describe ways of efficiently managing material and water in the process.</li> <li>• Explain the basics of electricity.</li> <li>• List common electrical and thermal equipment used in a plumbing workplace.</li> <li>• Describe the use of prevalent energy efficient devices.</li> <li>• List indicators of common electrical problems.</li> <li>• Discuss common practices of conserving electricity.</li> <li>• Explain the importance of checking if the equipment/machine is functioning normally before commencing work and ensuring it is rectified.</li> <li>• Explain the usage of different colours of dustbins.</li> <li>• Differentiate between recyclable and non-recyclable, and hazardous waste generated.</li> <li>• Discuss efficient waste management practices.</li> <li>• Discuss the common ways employed by organizations, to minimize waste generated from plumbing activities.</li> <li>• Discuss common sources of pollution and ways to minimize it</li> <li>• Explain the importance of reporting malfunctioning (fumes /sparks /emission /vibration /noise) and lapse in the maintenance of equipment on time.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify ways to optimize usage of water and other materials in various tasks/activities/processes.</li> <li>• Perform inspection to check for spills/leakages at a workplace.</li> <li>• Apply various material conservation practices with respect to plumbing work.</li> <li>• Perform inspection of the work area for improperly connected electrical equipment.</li> <li>• Apply appropriate techniques to use energy/electricity in an optimum way.</li> <li>• Categorize waste into dry, wet, recyclable, non-recyclable and items of single-use plastics.</li> <li>• Employ effective waste management / recycling practices.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
<b>Tools, Equipment and Other Requirements</b>	
Energy-saving devices, Non-recyclable, recyclable and reusable waste	

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification <i>&lt;Select the minimum educational requirements, such as 12<sup>th</sup> Pass, Graduate or NSQF certified.&gt;</i>	Specialization <i>&lt;Specify the areas of specialization that are desirable.&gt;</i>	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma	Civil or Mechanical Engineering	3	Plumbing/ Water treatment	1	Plumbing/ Water treatment	
ITI	Civil or Mechanical Engineering	4	Plumbing/ Water treatment	1	Plumbing/ Water treatment	
12th Pass	Science	4	Plumbing/ Water treatment	1	Plumbing/ Water treatment	

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: “Water Pump Operator” mapped to QP: “PSC/Q0117, v1.0”. Minimum accepted score is 80%.	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q2601”. Minimum accepted score as per MEPSC guidelines is 80%.

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification <Select the minimum educational requirements, such as 12 <sup>th</sup> Pass, Graduate or NSQF certified.>	Specialization <Specify the areas of specialization that are desirable.>	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma	Civil or Mechanical Engineering	3	Plumbing/ Water treatment	1	Plumbing/ Water treatment	
ITI	Civil or Mechanical Engineering	4	Plumbing/ Water treatment	1	Plumbing/ Water treatment	
12th Pass	Science	4	Plumbing/ Water treatment	1	Plumbing/ Water treatment	

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role: “Water Pump Operator” mapped to QP: “PSC/Q0117, v1.0”. Minimum accepted score is 80%.	Recommended that the Assessor is certified for the Job Role: “Assessor”, mapped to the Qualification Pack: “MEP/Q2701”. Minimum accepted score as per MEPSC guidelines is 80%.

## Assessment Strategy

Assessment is done through third parties who are affiliated to WMPSC as Assessment Body.

Assessors are trained & certified by WMPSC through Training of Assessors program. The assessment involves two processes. The first process is gathering the evidence of the competency of individuals. The second part of the assessment process is the judgement, based on the evidence as to whether a person is competent as per the standard or not. The assessment plan contains the following information:

- What will be assessed, i.e. the competency based on each NOS
- How assessment will occur i.e. methods of assessment
- When the assessment will occur
- Where the assessment will take place i.e. context of the assessment (workplace/simulation)
- The criteria for decision making i.e. those aspects that will guide judgements and
- Where appropriate, any supplementary criteria used to make a judgement on the level of performance.

The assessment is conducted through theory, viva voce and practical.

## References

## Glossary

Term	Description
<b>Declarative Knowledge</b>	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
<b>Key Learning Outcome</b>	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of the training</b> .
<b>Terminal Outcome</b>	Terminal outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of a module</b> . A set of terminal outcomes help to achieve the training outcome.



## Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards