Qualification Pack

Technician - Water Distribution System (Multi - Skill)

QP Code: PSC/Q0120

Version: 1.0

NSQF Level: 4

Water Management and Plumbing Skill Council
Unit No-606, DLF Prime TowerOkhla Phase-1 New Delhi-110020

Contents

Qualification Pack

PSC/Q0120: Technician - Water Distribution System (Multi - Skill)

Brief Job Description

The Technician - Water Distribution System monitors and controls water system facilities and equipment manually and / or using information technology to regulate raw water supply and treated water distribution, control pumps, solar system and electrical appliances, monitor water quality and performs related work as required.

Personal Attributes

The individual must be able to work independently and be comfortable in performing laborious work. The individual must also demonstrate strong work ethics, good communication skills and should have an ability to properly follow the instructions of supervisor.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. PSC/N0163: Installation and Operations of Plumbing and Water Management Systems
2. PSC/N0164: Perform Troubleshooting and Maintenance of Plumbing Systems
3. PSC/N0165: Perform Water Quality Monitoring and Maintenance of Water Supply Stations and Water Sources
4. PSC/N0166: Perform Installation, Operation and Maintenance of Pumps and Related Machinery at Water Supply Stations and Water Treatment Units
5. PSC/N0167: Perform Operation and Maintenance of Solar Systems and Electrical Panel
6. PSC/N0136: Apply Health and Safety Practices at the Workplace
7. PSC/N0137: Work Effectively with Others
8. DGT/VSQ/N0101: Employability Skills (30 Hours)

Qualification Pack (QP) Parameters

Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance

Qualification Pack

Country	India
NSQF Level	4
Credits	15
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7126.0101, NCO-2015/3132.0600, NCO-2015/8212.0402
Minimum Educational Qualification & Experience	12th grade Pass OR 10th Class/I.T.I with 2 Years of experience Relevant OR 8th grade pass with 2 year NTC plus 1 year NAC plus 1 year CITS OR Previous relevant Qualification of NSQF Level (3 with min. 8th Grade Pass) with 3 Years of experience Relevant
Minimum Level of Education for Training in School	10th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	03/05/2026
NSQC Approval Date	03/05/2023
Version	1.0
Reference code on NQR	QM-04-PL-00371-2023-V1-WMPS
NQR Version	1.0

PSC/N0163: Installation and Operations of Plumbing and Water Management Systems

Description

This unit is about the identification of sites, proper usages of tools and equipment for the installation and operations of plumbing and water management system.

Scope

The scope covers the following :

- prepare for installation of plumbing system
- install plumbing pipes, fittings, sanitary fixtures and CP fittings
- post installation operations and checks

Elements and Performance Criteria

preparation for installation

To be competent, the user/individual on the job must be able to:

PC1. collect plumbing material as per type, size and requirement based on specifications from drawings and plans

PC2. correct measurement and marking the dimensions for fabrication on the pipes and fittings making allowances for spring-back, distortion and assembly carefully.

install plumbing pipes, fittings, sanitary fixtures and CP fittings

To be competent, the user/individual on the job must be able to:

PC3. cut various types of pipes to appropriate length

PC4. bend and form the pipes to specified angle and offsets

PC5. prepare pipe ends using techniques such as reaming, leveling, filing, grinding, etc.

PC6. joining of different type of pipes using fittings and relevant techniques

PC7. construct chambers to accommodate drainage systems as per drawings/specifications

PC8. locate various drainage components and its route as per plumbing project plans.

PC9. carry out installation of the various components of drainage system such as pipes and their fittings, manholes, traps, cleanouts, catch basins, inspection chamber, soak pit etc.

PC10. selection of type, size and quantity of fixture according to given specifications

PC11. cutting of physical structures such as walls, concrete in line with correct markings and specifications to perform internal pipe installations

PC12. install valves and traps as per plumbing project plan

PC13. install fixtures as per specifications without damaging fixtures, pipework and the surrounding conditions etc.

PC14. install and secure the sensors for touchless fittings and fixtures in the provided slot and insert batteries for sensor-based fittings and fixtures safely

post installation operations and checks

To be competent, the user/individual on the job must be able to:

PC15. clear the area from hazardous substances, debris and waste as per organizational norms and plan tasks in agreement with others while adhering to time commitments

PC16. make sure that all inspection openings and covers are being fitted according to relevant standards and job specifications

PC17. test the installations for proper functioning

PC18. check and rectify faults that are within limits of expertise and escalate higher authorities to rectify it

PC19. backfill excavated areas to secure the installation

PC20. clear the work area and dispose, reuse or recycle left over materials according to legislation, regulations, codes of practice and job specification

PC21. clean and store tools and equipment according to manufacturer's recommendations and workplace procedures

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organization's policies on quality and delivery standards, safety and hazards, integrity, dress code, etc.

KU2. individual's role in the workflow

KU3. risk and impact of not following defined procedures/work instructions

KU4. standards, regulations and codes of practice relevant to the plumbing industry

KU5. alignment and elevation techniques used in plumbing systems

KU6. types of various plumbing fixtures, pipes and fittings

KU7. layout of piping systems and types and grades of pipes and fittings

KU8. identification of standard plumbing symbols used in sketches and blueprints

KU9. techniques of installing the water piping system in a building such as over ground piping, underground piping, piping embedded in concrete, concealed piping, wall mounted piping

KU10. standards applicable to the piping installation in plumbing

KU11. principles of siphon ball valves in a flushing system

KU12. types of plumbing fixtures and fittings that comes with sensor

KU13. basic working principal of sensor faucet

KU14. principles of valves and sensors in touchless system

KU15. description and sizes of pantry and laundry sinks, their waste outlets, bathtubs and its accessories

KU16. importance of introducing the traps of the sanitary fittings, both deep seal traps and low seal traps

KU17. properties of water, including pressure and flow rates

KU18. characteristics and the application of different pipe fittings and fixture supports, including fixing and jointing techniques

KU19. process of main supply of water and drainage

KU20. description of soil waste pipe, siphon pipe and vent pipe and their importance

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. perform arithmetic calculations of addition, subtraction, multiplication, division and conversion processes

GS2. read and interpret information (symbols, dimensions, terminology, dates etc.) given in local language or Hindi

GS3. prepare checklists, reports and fill out forms in local language or Hindi/English

GS4. measure all dimensions used in plumbing in metric scale

GS5. state information, doubts and concerns about work related matters in local language or Hindi/English

GS6. plan one's daily tasks to achieve maximum productivity

GS7. be punctual and work as per agreed priorities

GS8. listen to customer's concerns and doubts carefully and address them

GS9. be courteous and polite with customers and team members

GS10. establish workable solutions for problems in hand in consultation with others and record them

GS11. breakdown relevant work process into its constituent activities for ease of analysis

GS12. identify ways to increase productivity and reduce errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
preparation for installation	2	6	-	2
PC1. collect plumbing material as per type, size and requirement based on specifications from drawings and plans	1	3	-	1
PC2. correct measurement and marking the dimensions for fabrication on the pipes and fittings making allowances for spring-back, distortion and assembly carefully.	1	3	-	1
install plumbing pipes, fittings, sanitary fixtures and CP fittings	21	29	-	9
PC3. cut various types of pipes to appropriate length	2	3	-	1
PC4. bend and form the pipes to specified angle and offsets	2	3	-	1
PC5. prepare pipe ends using techniques such as reaming, leveling, filing, grinding, etc.	1	3	-	1
PC6. joining of different type of pipes using fittings and relevant techniques	2	3	-	1
PC7. construct chambers to accommodate drainage systems as per drawings/specifications	1	3	-	1
PC8. locate various drainage components and its route as per plumbing project plans.	1	2	-	1
PC9. carry out installation of the various components of drainage system such as pipes and their fittings, manholes, traps, cleanouts, catch basins, inspection chamber, soak pit etc.	2	2	-	0.5
PC10. selection of type, size and quantity of fixture according to given specifications	2	2	-	0.5
PC11. cutting of physical structures such as walls, concrete in line with correct markings and specifications to perform internal pipe installations	2	2	-	0.5
PC12. install valves and traps as per plumbing project plan	2	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. install fixtures as per specifications without damaging fixtures, pipework and the surrounding conditions etc.	2	2	-	0.5
PC14. install and secure the sensors for touchless fittings and fixtures in the provided slot and insert batteries for sensor-based fittings and fixtures safely	2	2	-	0.5
post installation operations and checks	7	20	-	4
PC15. clear the area from hazardous substances, debris and waste as per organizational norms and plan tasks in agreement with others while adhering to time commitments	1	3	-	0.5
PC16. make sure that all inspection openings and covers are being fitted according to relevant standards and job specifications	1	3	-	0.5
PC17. test the installations for proper functioning	1	2	-	1
PC18. check and rectify faults that are within limits of expertise and escalate higher authorities to rectify it	1	3	-	0.5
PC19. backfill excavated areas to secure the installation	1	3	-	0.5
PC20. clear the work area and dispose, reuse or recycle left over materials according to legislation, regulations, codes of practice and job specification	1	3	-	0.5
PC21. clean and store tools and equipment according to manufacturer's recommendations and workplace procedures	1	3	-	0.5
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0163
NOS Name	Installation and Operations of Plumbing and Water Management Systems
Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance
NSQF Level	4
Credits	4
Version	1.0
Last Reviewed Date	NA
Next Review Date	13/06/2026
NSQC Clearance Date	13/06/2023

PSC/N0164: Perform Troubleshooting and Maintenance of Plumbing Systems

Description

This unit is about identification of the problems / faults in installed plumbing systems and various techniques to repair and modify the faults.

Scope

The scope covers the following :

- identification of faults in installed plumbing systems
- perform repair and maintenance of plumbing system
- post maintenance activities

Elements and Performance Criteria

identifying faults in the plumbing systems

To be competent, the user/individual on the job must be able to:

PC1. detect leakages, blockages and damages in plumbing systems (water supply and drainage pipes, fittings and sanitary fixtures) with precise accuracy

PC2. conduct hydro test for checking leakages and pressure levels within piping systems by applying desired water pressure to check joints in the systems

PC3. identify the causes of low water pressure or water flow problems if applicable

perform repair and maintenance in the plumbing system

To be competent, the user/individual on the job must be able to:

PC4. rectify faults in pipework

PC5. repair and maintain water supply tanks and valves and remove air locks and blockages in the installed pipelines

PC6. repair broken sewer, dripping faucets and fixtures that are not working properly after unclogging drains and drain's strainer baskets

PC7. resolve the problems due to leakages, loosening and jamming of fittings

PC8. implement appropriate measures to reduce noise in pipes and fixtures

PC9. inspect and maintain the septic systems on timely basis

PC10. perform basic services for appliances such as water heaters, washing machines and dishwashers etc.

post-maintenance activities

To be competent, the user/individual on the job must be able to:

PC11. perform cleaning up of spills quickly after the task has been completed

PC12. empty waste containers as per organisational procedures

PC13. discard oily rags, flammable materials and that may cause risk as per industry standards

PC14. record daily logs in a specified format for activities such as maintenance and installation

PC15. guide customers on proper care and maintenance of plumbing systems

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organization's policies on quality and delivery standards, safety and hazards, integrity, dress code, etc

KU2. risk and impact of not following defined procedures/work instructions

KU3. organisational requirements of documentation for work

KU4. organisational policies on repair work w.r.t. cost, time, material, process, etc.

KU5. standards, regulations and codes of practice relevant to the plumbing industry

KU6. types of plumbing related tools, equipment, fixtures, pipes, fittings, supports, fasteners, etc.

KU7. various pipes used in plumbing such as metal pipes cast iron (CI), galvanised iron (GI), plastic pipes , polyvinyl chloride (PVC) pipes, chlorinated polyvinyl chloride (cPVC) , stoneware pipes, soft, semi soft and hard temper

KU8. characteristics, materials, finishes, uses, limitations and performance measures of plumbing related fixtures and fittings

KU9. SI system of measurement

KU10. properties of water, including pressure and flow rates

KU11. mathematical formulas needed to calculate pipe length and piping offsets

KU12. capillary action, thermal expansion and fabrication techniques to prevent leaking installations

KU13. characteristics and the application of different pipe fittings and fixture supports, including fixing and jointing techniques

KU14. process of mains supply of water and drainage and their plumbing

KU15. layout of piping systems

KU16. various fit off processes and their tools and principles

KU17. common plumbing problems with respect to fixtures, pipes and fittings and their remedial and preventive measures

KU18. test procedures to check proper functioning of the fixtures and pipework installed

KU19. application of mechanical and hydraulic principles for clearing blockages

KU20. corrosion protection such as coatings and tape

KU21. correct practices for troubleshooting and maintenance for plumbing fixtures and systems

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write common words/signs and set phrases used in the work

GS2. prepare checklists, reports and fill out forms in local language or Hindi/English

GS3. measure all dimensions used in plumbing in metric scale

GS4. perform arithmetic calculations of addition, subtraction, multiplication and division processes

GS5. read and interpret information (symbols, dimensions, terminology, dates etc.) given in local language or Hindi

GS6. state information, doubts and concerns about work related matters in local language or Hindi/English

GS7. spot discrepancies or errors and select the most efficient solution

GS8. plan one's daily tasks to achieve maximum productivity

GS9. be punctual and work as per agreed priorities

GS10. listen to customer's concerns and doubts carefully and address them

GS11. be courteous and polite in communications with customers and team

GS12. establish workable solutions for problems in hand in consultation with others and record them

GS13. identify ways to improve quality of work and reduce errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
identifying faults in the plumbing systems	6	12	-	3
PC1. detect leakages, blockages and damages in plumbing systems (water supply and drainage pipes, fittings and sanitary fixtures) with precise accuracy	3	4	-	1
PC2. conduct hydro test for checking leakages and pressure levels within piping systems by applying desired water pressure to check joints in the systems	2	4	-	1
PC3. identify the causes of low water pressure or water flow problems if applicable	1	4	-	1
perform repair and maintenance in the plumbing system	15	28	-	7
PC4. rectify faults in pipework	3	4	-	1
PC5. repair and maintain water supply tanks and valves and remove air locks and blockages in the installed pipelines	3	4	-	1
PC6. repair broken sewer, dripping faucets and fixtures that are not working properly after unclogging drains and drain's strainer baskets	2	4	-	1
PC7. resolve the problems due to leakages, loosening and jamming of fittings	2	4	-	1
PC8. implement appropriate measures to reduce noise in pipes and fixtures	2	4	-	1
PC9. inspect and maintain the septic systems on timely basis	2	4	-	1
PC10. perform basic services for appliances such as water heaters, washing machines and dishwashers etc.	1	4	-	1
post-maintenance activities	9	15	-	5
PC11. perform cleaning up of spills quickly after the task has been completed	3	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. empty waste containers as per organisational procedures	2	3	-	1
PC13. discard oily rags, flammable materials and that may cause risk as per industry standards	2	3	-	1
PC14. record daily logs in a specified format for activities such as maintenance and installation	1	3	-	1
PC15. guide customers on proper care and maintenance of plumbing systems	1	3	-	1
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0164
NOS Name	Perform Troubleshooting and Maintenance of Plumbing Systems
Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance
NSQF Level	4
Credits	4
Version	1.0
Last Reviewed Date	NA
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

PSC/N0165: Perform Water Quality Monitoring and Maintenance of Water Supply Stations and Water Sources

Description

This unit is about water quality testing which is the process of analyzing the physical, chemical, and biological properties of water to determine its safety and suitability for various uses, such as drinking, swimming, or agricultural purposes along with maintenance of local ground water sources and water sources.

Scope

The scope covers the following :

- monitor the quality of water by various techniques
- manage the quality of water as per given standards
- maintain ground water resources
- maintain spring and surface water sources

Elements and Performance Criteria

monitor the quality of water by various techniques

To be competent, the user/individual on the job must be able to:

PC1. identify the correct method of water sampling according to the standard operating procedure

PC2. obtain the water sample from the source and send samples for laboratory testing

PC3. test the water sample for its quality using the water testing kits

PC4. identify the TDS level and pH of the water

PC5. identify for faecal contamination and heavy metals composition in water

PC6. check for the various color coding in kit to ensure the different water quality parameters

PC7. perform the various tests with the help of water quality testing

PC8. share the water quality testing result with the appropriate higher authorities

manage the quality of water as per given standards

To be competent, the user/individual on the job must be able to:

PC9. ensure that the quality of water is not preceding the water quality standards as per government guidelines.

PC10. repair any small damages to the system

PC11. check there is no unwanted human intervention or animal intrusion

PC12. check whether the area is free from waste disposal and defecation

PC13. verify the discharge of water

maintain ground water resources

To be competent, the user/individual on the job must be able to:

PC14. check all the flange nuts and bolts, axle bolt and tighten as needed

PC15. verify whether hand pump is firm on its base and fix it (if needed), open the cover, clean the pump, dismantle the hand pump for inspection/cleaning and reassemble after inspection of hand pumps

PC16. verify rusty patches, clean with a wire brush and apply anticorrosive paint, discharge of water, handle position and clean pump components of hand pumps

PC17. operate pump starter and isolation valve for maintenance of tube well and bore well

PC18. check if readings on ammeter and voltmeter are normal – stop pump if electric motor is drawing too much current and verify whether adequate water is being delivered

PC19. clean the pump house and check for leaks in the rising main

PC20. inspect pipes, electric cables, insulation between cables, re-cut corroded or damaged threads, replace badly corroded pipes, de-silt borehole if required

PC21. take action as per standard operating procedure to troubleshoot faults occurring in the hand pump, tube or bore well

maintain spring and surface water sources

To be competent, the user/individual on the job must be able to:

PC22. check whether the area is free from waste disposal and defecation

PC23. check there is no unwanted human intervention or animal intrusion

PC24. check intake for clogging and submergence

PC25. repair any small damages to the intake system, then dewater and clean the bottom of the spring source

PC26. check the water level of the surface water source and de-silt as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standards, policies, and procedures followed in the company relevant to the task

KU2. workplace safety requirements, hazard reporting and handling procedures

KU3. importance and procedure of water testing

KU4. importance of water quality monitoring

KU5. water quality monitoring tasks

KU6. importance of regular inspection and the inspection process

KU7. importance of maintaining records

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. prepare checklists, reports and fill out forms in local language or Hindi/English

GS2. measure all dimensions used in plumbing in metric scale

GS3. perform arithmetic calculations of addition, subtraction, multiplication and division processes

GS4. read and interpret information (symbols, dimensions, terminology, dates etc.) given in local language or Hindi

GS5. state information, doubts and concerns about work related matters in local language or Hindi/English

GS6. plan one's daily tasks to achieve maximum productivity

GS7. be punctual and work as per agreed priorities

GS8. listen to customer's concerns and doubts carefully and address them

GS9. be courteous and polite with customers and team members

GS10. establish workable solutions for problems in hand in consultation with others and record them

GS11. breakdown relevant work process into its constituent activities for ease of analysis

GS12. identify ways to increase productivity and reduce errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
monitor the quality of water by various techniques	10	18	-	5
PC1. identify the correct method of water sampling according to the standard operating procedure	1	2	-	0.5
PC2. obtain the water sample from the source and send samples for laboratory testing	1	2	-	0.5
PC3. test the water sample for its quality using the water testing kits	1	2	-	0.5
PC4. identify the TDS level and pH of the water	2	3	-	1
PC5. identify for faecal contamination and heavy metals composition in water	1	2	-	0.5
PC6. check for the various color coding in kit to ensure the different water quality parameters	2	3	-	1
PC7. perform the various tests with the help of water quality testing	1	2	-	0.5
PC8. share the water quality testing result with the appropriate higher authorities	1	2	-	0.5
manage the quality of water as per given standards	5	10	-	3
PC9. ensure that the quality of water is not preceding the water quality standards as per government guidelines.	1	2	-	0.5
PC10. repair any small damages to the system	1	2	-	0.5
PC11. check there is no unwanted human intervention or animal intrusion	1	2	-	0.5
PC12. check whether the area is free from waste disposal and defecation	1	2	-	0.5
PC13. verify the discharge of water	1	2	-	1
maintain ground water resources	10	17	-	4
PC14. check all the flange nuts and bolts, axle bolt and tighten as needed	1	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. verify whether hand pump is firm on its base and fix it (if needed), open the cover, clean the pump, dismantle the hand pump for inspection/cleaning and reassemble after inspection of hand pumps	2	2	-	0.5
PC16. verify rusty patches, clean with a wire brush and apply anticorrosive paint, discharge of water, handle position and clean pump components of hand pumps	1	2	-	0.5
PC17. operate pump starter and isolation valve for maintenance of tube well and bore well	2	3	-	0.5
PC18. check if readings on ammeter and voltmeter are normal – stop pump if electric motor is drawing too much current and verify whether adequate water is being delivered	1	2	-	0.5
PC19. clean the pump house and check for leaks in the rising main	1	2	-	0.5
PC20. inspect pipes, electric cables, insulation between cables, re-cut corroded or damaged threads, replace badly corroded pipes, de-silt borehole if required	1	2	-	0.5
PC21. take action as per standard operating procedure to troubleshoot faults occurring in the hand pump, tube or bore well	1	2	-	0.5
maintain spring and surface water sources	**5**	**10**	**-**	**3**
PC22. check whether the area is free from waste disposal and defecation	1	2	-	0.5
PC23. check there is no unwanted human intervention or animal intrusion	1	2	-	0.5
PC24. check intake for clogging and submergence	1	2	-	0.5
PC25. repair any small damages to the intake system, then dewater and clean the bottom of the spring source	1	2	-	0.5
PC26. check the water level of the surface water source and de-silt as per requirement	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	30	55	-	15

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0165
NOS Name	Perform Water Quality Monitoring and Maintenance of Water Supply Stations and Water Sources
Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	NA
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

PSC/N0166: Perform Installation, Operation and Maintenance of Pumps and Related Machinery at Water Supply Stations and Water Treatment Units

Description

This unit is about installing pumps systems, efficient pump operation, preventive maintenance of the pump and related machinery such as motor, valves and electrical components at water distribution and storage systems at water supply stations and water treatment units.

Scope

The scope covers the following :

- install pump and related equipment
- operate the pump
- maintain the pump and related machinery
- maintain sump and storage tanks
- Maintain water meters and flow meters
- Operate, maintain and repair pipelines and water treatment units

Elements and Performance Criteria

Install pump and related equipment

To be competent, the user/individual on the job must be able to:

PC1. understand water supply and drainage systems in rural India

PC2. assemble pump components, equipment and prepare the tools, area and materials for the task as per Manufacturer's policy

PC3. locate and mark position for inlet and outlet supply connections of pump

PC4. fix the pump at the designated location as per instruction and connect the hoses of inlet and outlet supply to the pump

PC5. make provisions for electrical and other required connections

PC6. install and connect pump components without any damage to pump, fixture, pipe work and the surrounding environment followed by adjusting the pressure/flow as per required supply and demand

PC7. check for cracks, defects and anomalies in the pumping apparatus, condition of couplings in the equipment, pumping on both suction and discharge sides

PC8. • check the oil level, fuel level, radiator coolant, air release valve and engine condition of a diesel operated pump and prime the same
• .

PC9. understand the usages and installation of different valves pertaining to plumbing and water management

Operate the pump

To be competent, the user/individual on the job must be able to:

PC10. prepare a schedule for running the main pumps and the standby

PC11. prime the centrifugal pump before start of operations before ensuring operation of the pump with full efficiency to improve output gain

PC12. operate the delivery valve; close bypass valves of reflux valve, sluice valve and butterfly valve; monitor sound, vibration, temperature and other related parameters to ensure smooth operation of the pump

PC13. check pump motor alignment and maintain input/output parameters

PC14. inspect the pump, related machinery and water supply system for faults, leaks, sparks, improper functioning, wear and tear or evidence of tampering

PC15. maintain a record of all pump operations timings, voltage, current, reading on gauges and flow meter, temperature, water level and any problem that occurred during the operations

PC16. perform operations on 3-Phase & Single-Phase Pump Operation Connections

Maintain the pump and related machinery

To be competent, the user/individual on the job must be able to:

PC17. identify, repair or replace sparking motors, leaking or worn out parts and tighten the foundation bolts

PC18. calibrate all vital instruments such as pressure gauge, vaccum gauge, ammeter, voltmeter, watt meters, frequency meter, tachometer and flow meter

PC19. conduct performance test of the pump discharge, head, efficiency and troubleshoot faults as per standard operating procedures

PC20. conduct various operations on pump control panel board for 3-phase and single phase pump

Maintain sump and storage tanks

To be competent, the user/individual on the job must be able to:

PC21. dewater, clean, disinfect and rinse sump and tank as per standard operating procedures

PC22. desilt the pump house area and perform leakage test to carry out rectification if needed

Maintain water meters and flow meters

To be competent, the user/individual on the job must be able to:

PC23. clean the dirt box or strainer and replace gaskets upon its wear and tear

PC24. prevent water seepage into the water meter and clean the chamber where the meter is installed

PC25. disassemble and reassemble the water meter for verification or repair

PC26. check the range, zero setting of the flow meter, inspect for bearing wear out and deposits in flow meter or corrosion of attached pipes

PC27. take action as per standard operating procedure to troubleshoot common faults in water meters and flow meters

Operate, maintain and repair pipelines and water treatment units

To be competent, the user/individual on the job must be able to:

PC28. operate water pipelines with required pressure by opening and shutting off the valves gradually

PC29. flush the system to clear sediments; service the valve chamber and valves; inspect the pipelines for damage, wear and tear, leakage, entrainment and water hammer and locate the leaks in the pipes

PC30. repair damaged pipelines and replace faulty parts like gaskets, valves joints and pipes that are not repairable

PC31. start and shut off the filtration process and adjust the rate of filtration as needed by adding chemicals

PC32. inspect equipment on a regular basis to ensure proper functioning and adherence to safety standards; monitor operating conditions, meters, gauges and collect and test water and sewage samples

PC33. record meter, gauge readings, and operational data to operate equipment

PC34. clean and maintain equipment, tanks, filter beds and other work areas

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. standards, policies, and procedures followed in the company relevant to the task

KU2. workplace safety requirements, hazard reporting and handling procedures

KU3. various types of pumps used in residential, agricultural and commercial setups and their terminologies

KU4. components of pump systems and related equipment, tools and materials used and preparatory requirements for pump system installation

KU5. basic knowledge on saddle and ferrule connections in pumping apparatus

KU6. types of water supply and its implication on pumping system, performance measures, applications & properties of water pumps as per manufacturers' specifications

KU7. mathematical calculations, measurement of units, levelling and alignment procedures

KU8. different types of pumping apparatus (reciprocating, rotary etc.), valves and associated equipment ,gauges, dials, monitoring apparatus and their purposes

KU9. dos and don'ts of various pumping systems as per their Standard Operating Procedures (SOPs) specified by the manufacturer.

KU10. function and operation of various valves such as bypass valves of reflux valve, sluice valve and butterfly valve during operation of the pumps

KU11. common sounds, vibrations, temperature and other related parameters that can change during the operation of the pump and their significance.

KU12. impact of various physical parameters like temperature, pressure, etc. on the properties of final output

KU13. importance of maintaining a record of pump operation timings

KU14. various preventive maintenance tasks to be performed timely and considerations to be taken while making a preventive maintenance schedule

KU15. calibration procedure of all vital instruments such as pressure gauge, vacuum gauge, ammeter, voltmeter, watt meters, frequency meter, tachometer and flow meter

KU16. performance testing procedure of the pump for discharge, head and efficiency and action to be taken for common faults

KU17. overview of water distribution and storage systems at water supply stations

KU18. operational and maintenance requirements and procedures for sump and storage tanks, water meters and flow meters

KU19. rate of filtration and need for adjustment and chemicals used in the water treatment units

KU20. various meter and gauges and information to be gathered from them

KU21. importance and procedure of water and sewage testing and maintaining records

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. prepare checklists, reports and fill out forms in local language or Hindi/English
GS2. perform arithmetic calculations of addition, subtraction, multiplication and division processes
GS3. establish priorities and deadlines in consultation with others and record them
GS4. plan one's daily tasks to achieve maximum productivity
GS5. be punctual and work as per agreed priorities
GS6. manage distractions and maintain workplace discipline
GS7. listen to customer's concerns and doubts carefully and address them
GS8. read and interpret information (symbols, dimensions, terminology, dates etc.) given in local language or English
GS9. state information, doubts and concerns about work related matters in local language or Hindi/English
GS10. be courteous and identify ways to increase productivity and reduce errors
GS11. breakdown relevant work process into its constituent activities for ease of analysis and identify ways to increase productivity and reduce error
GS12. establish workable solutions for problems in hand in consultation with others and record them

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Install pump and related equipment	7	13	-	3.5
PC1. understand water supply and drainage systems in rural India	0.5	1	-	0.25
PC2. assemble pump components, equipment and prepare the tools, area and materials for the task as per Manufacturer's policy	0.5	1	-	0.25
PC3. locate and mark position for inlet and outlet supply connections of pump	1	2	-	0.5
PC4. fix the pump at the designated location as per instruction and connect the hoses of inlet and outlet supply to the pump	1	2	-	0.5
PC5. make provisions for electrical and other required connections	1	2	-	0.5
PC6. install and connect pump components without any damage to pump, fixture, pipe work and the surrounding environment followed by adjusting the pressure/flow as per required supply and demand	1	2	-	0.5
PC7. check for cracks, defects and anomalies in the pumping apparatus, condition of couplings in the equipment, pumping on both suction and discharge sides	1	2	-	0.5
PC8. • check the oil level, fuel level, radiator coolant, air release valve and engine condition of a diesel operated pump and prime the same • .	1	1	-	0.5
PC9. understand the usages and installation of different valves pertaining to plumbing and water management	-	-	-	-
Operate the pump	6	12	-	3
PC10. prepare a schedule for running the main pumps and the standby	1	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. prime the centrifugal pump before start of operations before ensuring operation of the pump with full efficiency to improve output gain	1	2	-	0.5
PC12. operate the delivery valve; close bypass valves of reflux valve, sluice valve and butterfly valve; monitor sound, vibration, temperature and other related parameters to ensure smooth operation of the pump	1	2	-	0.5
PC13. check pump motor alignment and maintain input/output parameters	1	2	-	0.5
PC14. inspect the pump, related machinery and water supply system for faults, leaks, sparks, improper functioning, wear and tear or evidence of tampering	1	2	-	0.5
PC15. maintain a record of all pump operations timings, voltage, current, reading on gauges and flow meter, temperature, water level and any problem that occurred during the operations	1	2	-	0.5
PC16. perform operations on 3-Phase & Single-Phase Pump Operation Connections	-	-	-	-
Maintain the pump and related machinery	**3**	**4**	**-**	**1.5**
PC17. identify, repair or replace sparking motors, leaking or worn out parts and tighten the foundation bolts	1	2	-	0.5
PC18. calibrate all vital instruments such as pressure gauge, vaccum gauge, ammeter, voltmeter, watt meters, frequency meter, tachometer and flow meter	1	1	-	0.5
PC19. conduct performance test of the pump discharge, head, efficiency and troubleshoot faults as per standard operating procedures	1	1	-	0.5
PC20. conduct various operations on pump control panel board for 3-phase and single phase pump	-	-	-	-
Maintain sump and storage tanks	**2**	**4**	**-**	**1**
PC21. dewater, clean, disinfect and rinse sump and tank as per standard operating procedures	1	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. desilt the pump house area and perform leakage test to carry out rectification if needed	1	2	-	0.5
Maintain water meters and flow meters	**5**	**9**	**-**	**2.5**
PC23. clean the dirt box or strainer and replace gaskets upon its wear and tear	1	2	-	0.5
PC24. prevent water seepage into the water meter and clean the chamber where the meter is installed	1	2	-	0.5
PC25. disassemble and reassemble the water meter for verification or repair	1	2	-	0.5
PC26. check the range, zero setting of the flow meter, inspect for bearing wear out and deposits in flow meter or corrosion of attached pipes	1	2	-	0.5
PC27. take action as per standard operating procedure to troubleshoot common faults in water meters and flow meters	1	1	-	0.5
Operate, maintain and repair pipelines and water treatment units	**7**	**13**	**-**	**3.5**
PC28. operate water pipelines with required pressure by opening and shutting off the valves gradually	1	2	-	0.5
PC29. flush the system to clear sediments; service the valve chamber and valves; inspect the pipelines for damage, wear and tear, leakage, entrainment and water hammer and locate the leaks in the pipes	1	2	-	0.5
PC30. repair damaged pipelines and replace faulty parts like gaskets, valves joints and pipes that are not repairable	1	2	-	0.5
PC31. start and shut off the filtration process and adjust the rate of filtration as needed by adding chemicals	1	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC32. inspect equipment on a regular basis to ensure proper functioning and adherence to safety standards; monitor operating conditions, meters, gauges and collect and test water and sewage samples	1	2	-	0.5
PC33. record meter, gauge readings, and operational data to operate equipment	1	2	-	0.5
PC34. clean and maintain equipment, tanks, filter beds and other work areas	1	1	-	0.5
NOS Total	**30**	**55**	**-**	**15**

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0166
NOS Name	Perform Installation, Operation and Maintenance of Pumps and Related Machinery at Water Supply Stations and Water Treatment Units
Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	NA
Next Review Date	13/06/2026
NSQC Clearance Date	13/06/2023

PSC/N0167: Perform Operation and Maintenance of Solar Systems and Electrical Panel

Description

This unit describes about knowledge of installation, operation and maintenance of different types of wiring, connection of mains, distribution board, junction box, control panel board, switches, plugs, sockets, procurement of PV system component and installation, operation and maintenance of Pumps through solar PV system

Scope

The scope covers the following :

- identification of basic electrical and solar components
- installation and operations on wiring, mains, distribution and control panel boards etc.
- installation and operations of solar pumping systems
- maintenance of control panel and solar pump systems

Elements and Performance Criteria

identification of basic electrical and solar components

To be competent, the user/individual on the job must be able to:

PC1. identify circuits, wiring diagrams and electrical signages, code specifications to plan wiring layouts and consumption points

PC2. use various types of tools, their functions and application for carrying out work and understand rating and current carrying capacity of wires, cables, fuse, switches, sockets, mcbs, elcbs and other electrical accessories

PC3. understand use of under-voltage protective devices, choice of setting of protective devices, labelling of protective devices, switches and terminals

PC4. check the color coding, connection and identification of conductors, cables and wires, routing of cables, proper selection of conductors, wires and connectors and connection of single pole device

PC5. explain various terminologies used in the solar industry and identify different components of Solar PV system and explain its basic operation along with manufacturer's specification sheet of different components

PC6. describe and analyze the different types, sizes and specifications of modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries and allied accessories.

installation and operations on wiring, mains, distribution and control panel boards

To be competent, the user/individual on the job must be able to:

PC7. understand layout of main switch, circuit breakers require at main board along with location of main board ensure for utilites service line connection

PC8. locate and mark the position of conduit pipe ensures, connections into the structures with proper equipment like measuring tape, hammer, saw, drill machines etc.

PC9. cut openings in structures to accommodate conduit pipes or pipe fittings, using hand or power tools

PC10. install brackets and hangers to support electrical equipment, install the protective device i.e. fuse, mcb, rccb, mccbs ratings as per the load and join and connect wire to fixtures and components to form circuits

PC11. align the main board chassis mounting slots with the lower studs of the Unit box and insert the control panel board (main board) into the unit box so that the main board chassis rests on the studs

PC12. insert the mounting screws, spring washers and the free earth lug of the wiring loom, and tighten screws

PC13. connect the main line to the control panel box as per given in the manual and check the supply voltage in the control panel

PC14. ensure all the operations in the control panel working properly and finally connect the control panel to the main system

installation and operations of solar pumping systems

To be competent, the user/individual on the job must be able to:

PC15. check the references of all components of the system to ensure that the installed components are those provided in the design

PC16. enhance the performance of SPV water pumping systems, manual or passive or auto tracking system must be used. For manual tracking, arrangement for seasonal tilt angle adjustment and three times manual tracking in a day should be provided.

PC17. check orientation and the inclination of the panels, and shadow on the solar PV generator. The orientation and inclination values must be close enough to those that were determined during calculations sizing

PC18. install "Surface Motor Pump sets" wherever the “Water table” in the reservoir or the water source from which the water is to be pumped, is within 10 metres of depth

PC19. check the cleanliness and protection of the wiring, and its compliance with the standards

PC20. inspect civil works (castle, basin, trough, fixing the solar supports etc.) piping, valves and all other important elements that can compromise the sound operation of the system

PC21. test the type of pump set to be used which must match the total dynamic head requirement of the site (i.e. the location at which it is installed)

maintenance of control panel and solar pump systems

To be competent, the user/individual on the job must be able to:

PC22. perform operations on lubrication and inspection on control panel (including cleanliness)

PC23. check that the door is closed and properly clamped and shut

PC24. close the pipeline isolation valve during troubleshooting, to prevent reverse flow through the pump

PC25. isolate the pump control valve before working on the panel and lock out the pump

PC26. perform regular cleaning of solar panels

PC27. shut down the pump as soon as the tank is full to avoid overflows

PC28. clean the surrounding from tall grass and trees by trimming them to make it free of litter and derbis

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. job responsibility/ duties and standard operating procedures, if any

KU2. basic elements of electricity, voltage, current, resistance, power, energy, and how electricity flows and basic knowledge of electrical circuits drawings and layouts

KU3. all types of conceal, open wiring. size of conduit pipe, batten and casing-capping required for each circuit

KU4. tools and tackles used for house wiring e.g. tools bag containing combination plier, cutter, screw drivers, hammer, chisel, drill machine, wrench set, hacksaw etc. importance of tools and equipment to be kept in a safe and usable condition

KU5. single phase motor, their operating principle, armature and rotor design, significance of number of poles in motor winding, connection of starting and running windings, rpm calculation, cooling system

KU6. efficiency, cost and typical specifications, functioning and operating principle of different types of solar photovoltaic plants, commercially available pv modules, inverters, charge controllers, battery, mounting structures, cables, junction boxes and other components

KU7. simple calculations to derive the power and energy received from solar radiation in a given area

KU8. efficiency, cost and typical specifications functioning and operating principle of different types of commercially available photovoltaic modules, inverters, charge controllers, battery, mounting structures, cables, junction boxes and other components

KU9. mechanical and electrical features necessary for the long life of the PV system under a wide range of operating conditions

KU10. tools required for installation and work in varying weather conditions

KU11. dos and dont's of material handling and storage

KU12. installation work on a solar pump system in accordance with relevant standards and regulations

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. complete documentation work applicable to the role

GS2. prepare checklists, reports and fill out forms in local language or Hindi/English

GS3. perform arithmetic calculations of addition, subtraction, multiplication and division processes

GS4. establish priorities and deadlines in consultation with others and record them

GS5. plan one's daily tasks to achieve maximum productivity

GS6. be punctual and work as per agreed priorities

GS7. manage distractions and maintain workplace discipline

GS8. listen to customer's concerns and doubts carefully and address them

GS9. read and interpret information (symbols, dimensions, terminology, dates etc.) given in local language or English

GS10. state information, doubts and concerns about work related matters in local language or Hindi/English

GS11. be courteous and identify ways to increase productivity and reduce errors

GS12. breakdown relevant work process into its constituent activities for ease of analysis and identify ways to increase productivity and reduce error

GS13. establish workable solutions for problems in hand in consultation with others and record them

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
identification of basic electrical and solar components	7	12	-	3
PC1. identify circuits, wiring diagrams and electrical signages, code specifications to plan wiring layouts and consumption points	1	2	-	0.5
PC2. use various types of tools, their functions and application for carrying out work and understand rating and current carrying capacity of wires, cables, fuse, switches, sockets, mcbs, elcbs and other electrical accessories	1	2	-	0.5
PC3. understand use of under-voltage protective devices, choice of setting of protective devices, labelling of protective devices, switches and terminals	1	2	-	0.5
PC4. check the color coding, connection and identification of conductors, cables and wires, routing of cables, proper selection of conductors, wires and connectors and connection of single pole device	1	2	-	0.5
PC5. explain various terminologies used in the solar industry and identify different components of Solar PV system and explain its basic operation along with manufacturer's specification sheet of different components	1.5	2	-	0.5
PC6. describe and analyze the different types, sizes and specifications of modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries and allied accessories.	1.5	2	-	0.5
installation and operations on wiring, mains, distribution and control panel boards	8	15	-	4
PC7. understand layout of main switch, circuit breakers require at main board along with location of main board ensure for utilites service line connection	1	1	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. locate and mark the position of conduit pipe ensures, connections into the structures with proper equipment like measuring tape, hammer, saw, drill machines etc.	1	2	-	0.5
PC9. cut openings in structures to accommodate conduit pipes or pipe fittings, using hand or power tools	1	2	-	0.5
PC10. install brackets and hangers to support electrical equipment, install the protective device i.e. fuse, mcb, rccb, mccbs ratings as per the load and join and connect wire to fixtures and components to form circuits	1	2	-	0.5
PC11. align the main board chassis mounting slots with the lower studs of the Unit box and insert the control panel board (main board) into the unit box so that the main board chassis rests on the studs	1	2	-	0.5
PC12. insert the mounting screws, spring washers and the free earth lug of the wiring loom, and tighten screws	1	2	-	0.5
PC13. connect the main line to the control panel box as per given in the manual and check the supply voltage in the control panel	1	2	-	0.5
PC14. ensure all the operations in the control panel working properly and finally connect the control panel to the main system	1	2	-	0.5
installation and operations of solar pumping systems	**8**	**15**	**-**	**4.5**
PC15. check the references of all components of the system to ensure that the installed components are those provided in the design	1	1	-	0.5
PC16. enhance the performance of SPV water pumping systems, manual or passive or auto tracking system must be used. For manual tracking, arrangement for seasonal tilt angle adjustment and three times manual tracking in a day should be provided.	1	2	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC17. check orientation and the inclination of the panels, and shadow on the solar PV generator. The orientation and inclination values must be close enough to those that were determined during calculations sizing	1.5	3	-	1
PC18. install "Surface Motor Pump sets" wherever the “Water table” in the reservoir or the water source from which the water is to be pumped, is within 10 metres of depth	1.5	3	-	1
PC19. check the cleanliness and protection of the wiring, and its compliance with the standards	1	2	-	0.5
PC20. inspect civil works (castle, basin, trough, fixing the solar supports etc.) piping, valves and all other important elements that can compromise the sound operation of the system	1	2	-	0.5
PC21. test the type of pump set to be used which must match the total dynamic head requirement of the site (i.e. the location at which it is installed)	1	2	-	0.5
maintenance of control panel and solar pump systems	**7**	**13**	**-**	**3.5**
PC22. perform operations on lubrication and inspection on control panel (including cleanliness)	1	1	-	0.5
PC23. check that the door is closed and properly clamped and shut	1	2	-	0.5
PC24. close the pipeline isolation valve during troubleshooting, to prevent reverse flow through the pump	1	2	-	0.5
PC25. isolate the pump control valve before working on the panel and lock out the pump	1	2	-	0.5
PC26. perform regular cleaning of solar panels	1	2	-	0.5
PC27. shut down the pump as soon as the tank is full to avoid overflows	1	2	-	0.5
PC28. clean the surrounding from tall grass and trees by trimming them to make it free of litter and derbis	1	2	-	0.5
NOS Total	**30**	**55**	**-**	**15**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0167
NOS Name	Perform Operation and Maintenance of Solar Systems and Electrical Panel
Sector	Plumbing
Sub-Sector	Water Supply & Water Treatment & Quality Control
Occupation	Plumbing Systems Installation and Maintenance
NSQF Level	4
Credits	1
Version	1.0
Last Reviewed Date	NA
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

PSC/N0136: Apply Health and Safety Practices at the Workplace

Description

This unit is about following safety procedures, communicating potential hazards and dangers of accidents on the job.

Scope

The scope covers the following :

- Follow safety measures to avoid accidents
- Daily inspection of tools and equipment
- Deal with emergencies

Elements and Performance Criteria

Follow safety measures to avoid accidents

To be competent, the user/individual on the job must be able to:

PC1. identify risks and hazards at the workplace

PC2. wear personal protective equipment (PPE) as per the type of plumbing work

PC3. place protective barricades and signages around the pits and trenches

PC4. isolate the plumbing fittings and fixtures from electrical wiring to avoid accidents

PC5. adhere to organisational procedures for reporting hazards and incidents to relevant authorities

PC6. establish ventilation before entering underground work areas

PC7. work safely in and around trenches, elevated places and confined areas

PC8. ensure tools and hazardous materials are not left unattended

PC9. ensure good housekeeping in order to prevent hazards e.g. fire

PC10. dispose waste materials and used PPE according to regulations and codes of practice

Follow hygiene and sanitation practices

To be competent, the user/individual on the job must be able to:

PC11. follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing etc.

PC12. clean and disinfect work area, materials/supplies, equipment etc. before and after use.

PC13. report hygiene and sanitation issues to appropriate authority

Use tools, equipment and materials safely

To be competent, the user/individual on the job must be able to:

PC14. check that the tools, equipment and materials are in good condition and as per industry standards before use

PC15. use power tools and machinery that are grounded

PC16. replace or repair split or loose tools before use

PC17. store and transport various plumbing materials safely

Deal with emergencies

To be competent, the user/individual on the job must be able to:

PC18. follow workplace emergency and evacuation procedures

PC19. use a fire extinguisher correctly

PC20. use safe methods to free a person from electrocution

PC21. administer appropriate first aid (such as CPR etc.) to victims in case of cuts, bleeding, burns, choking, electric shock, poisoning etc.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. possible causes of risk, hazard or accident in the workplace

KU2. organisational procedures for upkeep of tools and plumbing materials, health and safety

KU3. location of all the general health and safety equipment in the workplace

KU4. meaning of hazards and risks

KU5. hazardous environment encountered during work such as underground areas, elevated areas, areas with water and electricity supply, presence of biological waste, under construction sites etc.

KU6. work practices and precautions to control and prevent risks, hazards and accidents

KU7. importance of each personal protective equipment used such as eye protection mask, hard hats, gloves, apron, rubber boots etc.

KU8. tools and plumbing equipment as per latest industry standards

KU9. preventative and remedial actions to be taken in case of exposure to toxic materials

KU10. specific safety and health related problems faced in domestic, commercial and institutional setups

KU11. various causes of fire and precautionary activities to prevent the fire accident

KU12. techniques of using the different fire extinguishers

KU13. rescue techniques applied during a fire hazard

KU14. various types of safety signs and meaning

KU15. appropriate basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, minor burns, poisoning, eye injuries etc.

KU16. potential injuries and ill health associated with incorrect handing of tools and equipment

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write an accident/incident report in local language or English

GS2. read and comprehend labels, charts, signages, manuals, plumbing symbols etc.

GS3. question coworkers appropriately in order to clarify instructions and other issues

GS4. plan and organize the work schedule, work area, tools, equipment and materials for improved productivity

GS5. determine key considerations and priorities when faced with problems

GS6. seek official and authorised sources of help and guidance to resolve problems that cannot be solved at one's level of authority

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Follow safety measures to avoid accidents	13	32	-	3
PC1. identify risks and hazards at the workplace	2	2	-	0.5
PC2. wear personal protective equipment (PPE) as per the type of plumbing work	2	2	-	0.5
PC3. place protective barricades and signages around the pits and trenches	1	4	-	0.5
PC4. isolate the plumbing fittings and fixtures from electrical wiring to avoid accidents	1	4	-	-
PC5. adhere to organisational procedures for reporting hazards and incidents to relevant authorities	2	4	-	0.5
PC6. establish ventilation before entering underground work areas	1	4	-	-
PC7. work safely in and around trenches, elevated places and confined areas	1	3	-	-
PC8. ensure tools and hazardous materials are not left unattended	1	3	-	-
PC9. ensure good housekeeping in order to prevent hazards e.g. fire	1	3	-	0.5
PC10. dispose waste materials and used PPE according to regulations and codes of practice	1	3	-	0.5
Follow hygiene and sanitation practices	3	8	-	1
PC11. follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing etc.	1	3	-	0.5
PC12. clean and disinfect work area, materials/supplies, equipment etc. before and after use.	1	3	-	0.5
PC13. report hygiene and sanitation issues to appropriate authority	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Use tools, equipment and materials safely	6	9	-	1
PC14. check that the tools, equipment and materials are in good condition and as per industry standards before use	1	3	-	0.25
PC15. use power tools and machinery that are grounded	1	2	-	0.25
PC16. replace or repair split or loose tools before use	2	2	-	0.25
PC17. store and transport various plumbing materials safely	2	2	-	0.25
Deal with emergencies	8	14	-	2
PC18. follow workplace emergency and evacuation procedures	2	3	-	0.5
PC19. use a fire extinguisher correctly	2	4	-	0.5
PC20. use safe methods to free a person from electrocution	2	3	-	0.5
PC21. administer appropriate first aid (such as CPR etc.) to victims in case of cuts, bleeding, burns, choking, electric shock, poisoning etc.	2	4	-	0.5
NOS Total	**30**	**63**	**-**	**7**

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0136
NOS Name	Apply Health and Safety Practices at the Workplace
Sector	Plumbing
Sub-Sector	Industrial / Non-Industrial Plumbing, Water Supply & Water Treatment & Quality Control, Sewerage & Sewage Treatment, Drainage, Water Harvesting & Ground Recharging, Firefighting & Safety Systems, Gas & Piping (Industrial / Medical), HVAC & Steam, Manufacturing of Plumbing / Firefighting Products, Micro-Hydel Power
Occupation	Plumbing Systems Installation and Maintenance, Designing, Sales, Material Handling, Plumbing Servicing, Plumbing Plant Operations
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

PSC/N0137: Work Effectively with Others

Description

This unit covers basic etiquette and competencies required in behavior and interactions with others at the workplace.

Scope

The scope covers the following :

- Communicate effectively
- Work in a team effectively
- Respect diversity

Elements and Performance Criteria

Communicate effectively

To be competent, the user/individual on the job must be able to:

PC1. obtain complete information and instructions

PC2. seek clarifications from appropriate source when required

PC3. provide information accurately and clearly

PC4. use inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive

Work in a team effectively

To be competent, the user/individual on the job must be able to:

PC5. prioritize tasks as required

PC6. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks

PC7. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict

PC8. act upon constructive feedback from others

Respect diversity

To be competent, the user/individual on the job must be able to:

PC9. transact with everyone without any personal bias based on gender, disability, caste, religion, colour, sexual orientation and culture

PC10. recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation and culture at workplace

PC11. report incidents of harassment and discrimination to appropriate authority

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. legislation, standards, policies, and procedures followed in the company relevant to employment, behavior, harassment, discrimination and performance conditions

KU2. reporting structure, inter-dependent functions, lines and procedures in the work area
KU3. escalation matrix and procedures for reporting work and employment related issues
KU4. types of harassment and discrimination based on gender, disability, caste, religion and culture and how to recognize it.
KU5. importance of effective communication and the impact of poor communication on the employee, the employer and the customer
KU6. importance of teamwork in organizational and individual success
KU7. various components of effective communication such as tone and pitch
KU8. importance of ethics and discipline for professional success
KU9. how to express and address grievances appropriately and effectively
KU10. importance and ways of managing interpersonal conflict effectively
KU11. different types of disabilities and the challenges faced by persons with disability (PwD)
KU12. laws, acts and provisions defined for PwD by the statutory bodies
KU13. government and private schemes and benefits available for PwD
KU14. Importance of gender sensitivity and equality.
KU15. gender, disability and cultural biases, stereotypes and impact on others
KU16. gender and its concepts such as gender roles, gender spectrum, gender as an identity
KU17. legislations, grievance redressal mechanisms, and penalties against harassment in the workplace

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write clear and legible notes, keep records, prepare to-do lists and take down instructions
GS2. write basic numbers, quantities and basic work-related terminology for operational requirements in the local language and English
GS3. read basic terminologies to accurately interpret labels, supervisor's instructions in the local language and English
GS4. read and interpret accurate information from work-related documents and various relevant work instructions and records in local
GS5. interact with the concerned personnel appropriately (correct protocol and manner of speaking etc.)
GS6. display active listening skills while interacting with co-workers and others in the workplace
GS7. deliver consistent and reliable service to internal and external customers
GS8. work with co-workers and supervisor to resolve any issues that threaten work quality as per the planned schedule

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively	11	26	-	2
PC1. obtain complete information and instructions	3	8	-	-
PC2. seek clarifications from appropriate source when required	1	5	-	-
PC3. provide information accurately and clearly	3	7	-	1
PC4. use inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive	4	6	-	1
Work in a team effectively	11	25	-	3
PC5. prioritize tasks as required	3	8	-	1
PC6. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks	3	8	-	1
PC7. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict	3	4	-	1
PC8. act upon constructive feedback from others	2	5	-	-
Respect diversity	8	12	-	2
PC9. transact with everyone without any personal bias based on gender, disability, caste, religion, colour, sexual orientation and culture	3	5	-	1
PC10. recognize indicators of harassment and discrimination based on gender, disability, caste, religion, colour, sexual orientation and culture at workplace	3	5	-	1
PC11. report incidents of harassment and discrimination to appropriate authority	2	2	-	-
NOS Total	**30**	**63**	**-**	**7**

National Occupational Standards (NOS) Parameters

NOS Code	PSC/N0137
NOS Name	Work Effectively with Others
Sector	Plumbing
Sub-Sector	Industrial / Non-Industrial Plumbing, Water Supply & Water Treatment & Quality Control, Sewerage & Sewage Treatment, Drainage, Water Harvesting & Ground Recharging, Firefighting & Safety Systems, Gas & Piping (Industrial / Medical), HVAC & Steam, Manufacturing of Plumbing / Firefighting Products, Micro-Hydel Power
Occupation	Plumbing Systems Installation and Maintenance, Designing, Sales, Material Handling, Plumbing Servicing, Plumbing Plant Operations
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values - Citizenship

To be competent, the user/individual on the job must be able to:

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC4. speak with others using some basic English phrases or sentences

Communication Skills

To be competent, the user/individual on the job must be able to:

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

To be competent, the user/individual on the job must be able to:

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	1	1	-	-
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
Constitutional values - Citizenship	1	1	-	-
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	1	3	-	-
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	2	3	-	-
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	1	1	-	-
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	1	1	-	-
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	3	4	-	-
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	4	6	-	-
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	3	5	-	-
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	2	2	-	-
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	1	3	-	-
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	20	30	-	-

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	NA
Next Review Date	13/06/2026
NSQC Clearance Date	13/06/2023

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.

4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of 100% aggregate marks to successfully clear the assessment.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
PSC/N0163.Installation and Operations of Plumbing and Water Management Systems	30	55	0	15	100	15
PSC/N0164.Perform Troubleshooting and Maintenance of Plumbing Systems	30	55	0	15	100	15
PSC/N0165.Perform Water Quality Monitoring and Maintenance of Water Supply Stations and Water Sources	30	55	0	15	100	15
PSC/N0166.Perform Installation, Operation and Maintenance of Pumps and Related Machinery at Water Supply Stations and Water Treatment Units	30	55	0	15	100	15
PSC/N0167.Perform Operation and Maintenance of Solar Systems and Electrical Panel	30	55	0	15	100	15
PSC/N0136.Apply Health and Safety Practices at the Workplace	30	63	-	7	100	10
PSC/N0137.Work Effectively with Others	30	63	-	7	100	10
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	5

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
Total	230	431	0	89	750	100

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
NCVET	National Council for Vocational Education and Training
WMPSC	Water Management and Plumbing Skill Council
QP	Qualification Pack
MC	Model Curriculum
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
NCO	National Classification of Occupations
ES	Employability Skills

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
Sector	Sector is a conglomeration of different business operations having similar business and interests.It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
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