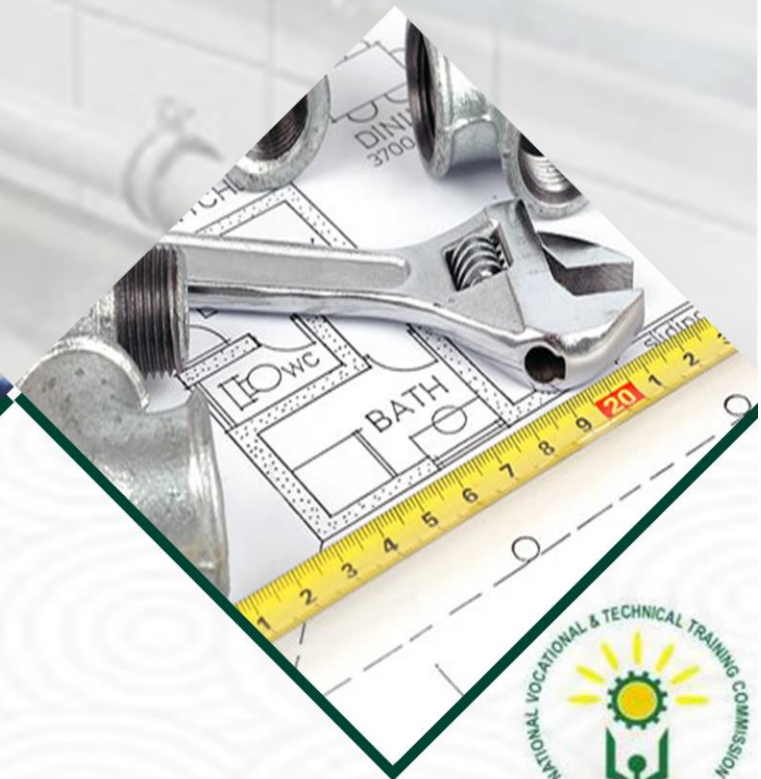


National Vocational Certificate Level 2 in Plumbing cum Solar Water Heating Technology

Competency Standard

Version 1

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Table of Contents

Competency Standards

A	Maintain workplace safety04
B	Apply continuing professional development05
C	Perform preventive maintenance as part of plumbing operations06
D	Perform corrective maintenance as part of plumbing operations07
E	Perform lay-out and excavation08
F	Fix basic sanitary ware09
G	Join fittings and pipes10
H	Use and maintain plumbing tools and equipment11
I	Installations, commissioning, operation and maintenance of Solar Water Heating System12

Documents, policies, guidelines13
--	---------

Tools and Equipment13
----------------------------	---------

Consumables16
--------------------	---------

Competency Standards: Plumbing cum Solar Heating Technician (Assistant) - Level 2

Competency Standard A: Maintain workplace safety

Overview: This competency standard is intended for those who carry out electrical operations. People holding credit for this competency standard are able to: Follow safe work procedures; apply tools and equipment safety measures; and follow workplace emergency procedures.

Competency Unit	Performance Criteria	Knowledge and Understanding
A1: Follow safe work procedures	P1- Organise and arrange duties, tools, equipment materials and work area P2- Use and store PPE P3- Perform tasks in a safe manner	K1- Company safety SOP/policy; Housekeeping practices; Factors that may influence safety at the workplace, such as anger and stress K2- Types of personal protective equipment K3- Safety signs and symbols; Isolation and lockout procedures
A2: Apply tools & equipment safety measures	P1- Check earthing for safety of equipment P2- Store tooling and equipment securely	K1- Method of earthing and its effects on safety K2- Storage and stacking methods of tools & equipment
A3: Follow workplace emergency procedures	P1- Follow safe workplace procedures for dealing with accidents, fires and emergencies within scope of responsibility	K- Scope of responsibility; First aid procedures; Fire safety and <u>emergency exit signs</u> , fire fighting procedures; Risk control measures

Competency Standard B: Apply continuing professional development

Overview: This competency standard is intended for those who carry out electrical operations. People holding credit for this competency standard are able to: Identify professional development needs; develop professional knowledge, skills and attitudes, and maintain professional proficiency.

Competency Unit	Performance Criteria	Knowledge and Understanding
B1: Identify professional development needs	P1- Discuss professional development needs P2- Identify professional development programmes	K1- Reasons for professional development K2- Access to programmes; Career guidance
B2- Develop professional knowledge, skills and attitudes	P1- Participate in training programmes P2- Document training outcome	K1- Outcomes and relevance of training K2- Report and portfolio writing
B3- Maintain professional proficiency	P1- Identify and use self-study sources P2- Implement self-study plan	K1- Research methods; Access to sources K2- Planning your career

Competency Standard C: Perform preventive maintenance as part of plumbing operations

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Plan and prepare for preventive maintenance; perform routine inspections; carry out preventive maintenance; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
C1: Plan and prepare for preventive maintenance	P1- Identify and obtain safety and other regulatory requirements for maintenance P2- Interpret layout diagrams P3- Identify and select tools and equipment	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment and calibration thereof
C2: Perform routine Inspection	P1- Check for safety hazards P2- Carry out procedures for routine checks P3- Document results	K1- Hazard and risk identification K2- Types of common faults; Safety precautions K3- Test and preventive reports
C3: Carry out preventive maintenance	P1- Perform minor adjustments and calibrations P2- Perform basic functional checks P3- Replace worn out or damaged parts	K1- Measurement and calculation of electrical parameters K2- Basic operation of appliance and settings to adjust performance K3- Communication skills
C4: Complete work	P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials	K1- Importance of documentation; Customer care procedures and techniques K2- Importance of quality; handing over to client K3- Waste disposal procedures; Care of tools and equipment

Competency Standard D: Perform corrective maintenance as part of plumbing operations

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Plan and prepare for corrective maintenance; perform troubleshooting; carry out corrective maintenance procedures; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
D1: Plan and prepare for corrective maintenance	P1- Identify and obtain safety and other regulatory requirements for maintenance P2- Interpret diagrams P3- Identify and select tools and equipment	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment and calibration thereof
D2: Perform troubleshooting	P1- Check for safety hazards P2- Carry out diagnostic procedures P3- Identify faulty parts and/or equipment P4- Analyse system fault	K1- Plumbing system knowledge and its hazards K2- Identification of faults by checking shape and size of components and parts; Safety precautions K3- Methods of fault identification in plumbing components for systems K4- Component operation in a plumbing system
D3: Carry out corrective maintenance procedures	P1- Dismantle faulty parts or components P2- Replace or repair faulty parts or components P3- Perform commissioning	K1- Dismantling procedures K2- Replacing and repairing procedures K3- Commissioning procedures K4- Commissioning do will be engineer
D4: Complete work	P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials	K1- Importance of documentation; Customer care procedures and techniques K2- Importance of quality; handing over to client K3- Waste disposal procedures; Care of tools and equipment

Competency Standard E: Perform lay-out and excavation

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Plan and prepare for work; excavate according to plan; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
E1: Plan and prepare for work	P1- Identify and obtain safety and other regulatory requirements for excavation P2- Interpret and confirm layout plan P3- Mark out excavation P4- Identify and select tools and equipment	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Marking out procedures K4- Tools and equipment and calibration thereof
E2: Excavate according to plan	P1- Check for safety hazards P2- Perform excavation P3- Install trench support	K1- Risk and hazards identification K2- Excavation procedures and techniques related to plumbing work; Safety precautions K3- Methods of trench support
E3: Complete work	P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials	K1- Importance of documentation; Customer care procedures and techniques K2- Importance of quality; handing over to client K3- Waste disposal procedures; Care of tools and equipment

Competency Standard F: Fix basic sanitary ware

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Plan and prepare for work; fix basic sanitary ware; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
F1: Plan and prepare for work	P1- Identify and select tools and equipment P2- Perform measurements	K1- Tools and equipment for fixing sanitary ware K2- Measuring units and conversions
F2: Fix basic sanitary ware	P1- Check for safety hazards P2- Mark out installation points and fixtures P3- Mount sanitary ware	K1- Risk and hazards identification K2- Marking out procedures; Type of fixtures; Safety precautions K3- Levelling procedures
F3: Complete work	P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials	K1- Importance of documentation; Customer care procedures and techniques K2- Importance of quality; handing over to client K3- Waste disposal procedures; care of tools and equipment

Competency Standard G: Join fittings and pipes

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Join fittings and pipes.

Competency Unit	Performance Criteria	Knowledge and Understanding
G1: Join fittings and pipes	P1- Identify and select tools and equipment P2- Measure pipes P3- Cut pipes to length P4- Join pipes and fittings	K1- Tools and equipment for installing fittings and pipes K2- Marking out procedures K3- Cutting procedures K4- Joining procedures

Competency Standard H: Use and maintain plumbing tools and equipment

Overview: This competency standard is intended for those who carry out plumbing operations. People holding credit for this competency standard are able to: Use plumbing tools and equipment; perform bench work; and maintain plumbing tools and equipment.

Competency Unit	Performance Criteria	Knowledge and Understanding
H1: Use plumbing tools and equipment	P1- Identify and select tools, equipment and instruments P2- Demonstrate safe use of tools, equipment and instruments	K1- Purpose and application of plumbing tools, equipment K2- Use of plumbing tools, equipment and instruments
H2: Perform bench work	P1- Secure work piece firmly P2- Use metal processing tools to perform chip removal forming processes P3- Use metal processing tools to perform chip-less forming processes	K1- Hazard and risk identification; Safety requirements K2- Material properties K3- Material properties
H3: Perform basic arc welding	P1- Prepare materials P2- Perform arc welding	K1- Setting up jigs, fixtures or clamps K2- Welding equipment; Welding rods, settings, and consumables <u>for Arc welding safety gloves</u>
H4: Maintain plumbing tools and equipment	P1- Describe preventive maintenance procedures P2- Maintain and/or replace tool insulation P3- Clean and store plumbing tools, equipment and instruments	K1- Preventive maintenance; Types of maintenance schedules or programmes for: - Tools; Equipment; Machinery; Facilities K2- Types of insulation and reports K3- Storage requirements - Tool box - Key lock system - Counting and tagging tools

Competency Standard I: Installations, commissioning, operation and maintenance of Solar Water Heating System

Overview: This competency standard is intended for those who carry out installations, commissioning, operation and maintenance of Solar Water Heating System. People holding credit for this module are able to understand Basics of Solar Water Heating Applications, Overview of Domestic and Commercial Solar Water Heating Systems and perform Commissioning, Operation and Maintenance of Domestic Solar Water Heating System

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>A1: Basics of Solar Water Heating Applications</p>	<p>P1- Define basics of solar water heating P2- Understand importance of solar water heating P3- Identify applications of solar water heating</p>	<p>K1- Define water heating K2- Define fundamentals of solar collectors and Solar tubes Flat plates. K2- Types of water heating system K3- Applications of solar water heating system</p>
<p>A2: Overview of Domestic and Commercial Solar Water Heating Systems</p>	<p>P1- Explain the basic functions of domestic solar water heating system P2- Identify types of solar water heating system P3- Analyze the water discharge level for domestic and commercial Water Heating Systems</p>	<p>K1- Define water heating functions ,Solar system effects and Principle of heating K2- Market needs, purpose and requirements of domestic and commercial water heating K3- Measurement of water discharge K4- Equipment used for calculation of water discharge</p>
<p>A3: Commissioning, Operation and Maintenance of Domestic Solar Water Heating System</p>	<p>P1- Follow safety and other regulatory requirements for Domestic Solar Water Heating System. P2- Interpret and confirm layout plan P3- Identify and select tools and equipment P4- Perform measurements P5- Conform to commissioning specifications P6- Conduct operational testing</p>	<p>K1- Safety and regulatory requirements K2- Drawings and symbols K3- Tools and equipment for Commissioning, Operation and Maintenance K4- Measuring units and conversions K5- Commissioning procedures and specifications K6- Testing procedures and requirements</p>

Documents, policies, guidelines:

- International Labour Organisation (ILO) Standards on Occupational Health and Safety
- Pakistan Electricity Act, 1910 and subsequent amendments
- Institute of Electrical and Electronics Engineers Standards Association (IEEE-SA)
- Industry code of practice



Should comply to all

Tools and Equipment:

No.	Description	Quantity
1	Personal protective equipment	<u>As per industry standard practice</u>
2	Tools and equipment for excavation	
3	Hand tools	
4	Adjustable wrench	
5	Bender	
6	Chisel	
7	Crumdy	
8	Drill machine	
9	Dye	
10	Extension board	

11	First Aid box	
12	Grinder	
13	Grip plier	
14	Hammer	
15	Hand bit	
16	Helmet	
17	Level	
18	First Aid box	
19	Hacksaw	
20	Level	
21	L-key set	
22	Measuring tape	
23	Overall combination	
24	Pipe wrench	
25	Plass (pipe cutter)	
26	PPR Heater	
27	PPR/G1 cutter	
28	Safety boots	
29	Screw driver set	
30	Spanner set	

31	Tester	
32	Testing pump (leakage)	
33	Tools box	
34	Torch	
35	Vice	

Consumables:

No.	Description	Quantity
1	Fire extinguisher	3
2	Fire blanket	3
3	Fire bucket	3
4	Computer	8
5	Printer	1
6	Scanner	1
7	Multimedia Projector	1
8	Flip chart with stand	3
9	Internet connection	1



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