

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

Competency Standards



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## 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
<b>A1:</b> <b>Follow safe work procedures</b>	<b>P1-</b> Organise and arrange duties, tools, equipment materials and work area <b>P2-</b> Use and store PPE <b>P3-</b> Perform tasks in a safe manner	<b>K1-</b> Company safety SOP/policy; Housekeeping practices; Factors that may influence safety at the workplace, such as anger and stress <b>K2-</b> Types of personal protective equipment <b>K3-</b> Safety signs and symbols; Isolation and lockout procedures
<b>A2:</b> <b>Apply tools &amp; equipment safety measures</b>	<b>P1-</b> Check earthing for safety of equipment <b>P2-</b> Store tooling and equipment securely	<b>K1-</b> Method of earthing and its effects on safety <b>K2-</b> Storage and stacking methods of tools & equipment
<b>A3:</b> <b>Follow workplace emergency procedures</b>	<b>P1-</b> Follow safe workplace procedures for dealing with accidents, fires and emergencies within scope of responsibility	<b>K-</b> 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
<b>B1:</b> <b>Identify professional development needs</b>	<b>P1-</b> Discuss professional development needs <b>P2-</b> Identify professional development programmes	<b>K1-</b> Reasons for professional development <b>K2-</b> Access to programmes; Career guidance
<b>B2-</b> <b>Develop professional knowledge, skills and attitudes</b>	<b>P1-</b> Participate in training programmes <b>P2-</b> Document training outcome	<b>K1-</b> Outcomes and relevance of training <b>K2-</b> Report and portfolio writing
<b>B3-</b> <b>Maintain professional proficiency</b>	<b>P1-</b> Identify and use self-study sources <b>P2-</b> Implement self-study plan	<b>K1-</b> Research methods; Access to sources <b>K2-</b> 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
<b>C1:</b> <b>Plan and prepare for preventive maintenance</b>	<b>P1-</b> Identify and obtain safety and other regulatory requirements for maintenance <b>P2-</b> Interpret layout diagrams <b>P3-</b> Identify and select tools and equipment	<b>K1-</b> Safety requirements; Specifications; Hazard identification <b>K2-</b> Drawings and symbols specifications <b>K3-</b> Tools and equipment and calibration thereof
<b>C2:</b> <b>Perform routine Inspection</b>	<b>P1-</b> Check for safety hazards <b>P2-</b> Carry out procedures for routine checks <b>P3-</b> Document results	<b>K1-</b> Hazard and risk identification <b>K2-</b> Types of common faults; Safety precautions <b>K3-</b> Test and preventive reports
<b>C3:</b> <b>Carry out preventive maintenance</b>	<b>P1-</b> Perform minor adjustments and calibrations <b>P2-</b> Perform basic functional checks <b>P3-</b> Replace worn out or damaged parts	<b>K1-</b> Measurement and calculation of electrical parameters <b>K2-</b> Basic operation of appliance and settings to adjust performance <b>K3-</b> Communication skills
<b>C4:</b> <b>Complete work</b>	<b>P1-</b> Complete work related documents and procedures <b>P2-</b> Perform final quality inspection <b>P3-</b> Clean up and store tools, equipment and materials	<b>K1-</b> Importance of documentation; Customer care procedures and techniques <b>K2-</b> Importance of quality; handing over to client <b>K3-</b> 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
<p><b>D1:</b> <b>Plan and prepare for corrective maintenance</b></p>	<p><b>P1-</b> Identify and obtain safety and other regulatory requirements for maintenance <b>P2-</b> Interpret diagrams <b>P3-</b> Identify and select tools and equipment</p>	<p><b>K1-</b> Safety requirements; Specifications; Hazard identification <b>K2-</b> Drawings and symbols specifications <b>K3-</b> Tools and equipment and calibration thereof</p>
<p><b>D2:</b> <b>Perform troubleshooting</b></p>	<p><b>P1-</b> Check for safety hazards <b>P2-</b> Carry out diagnostic procedures <b>P3-</b> Identify faulty parts and/or equipment <b>P4-</b> Analyse system fault</p>	<p><b>K1-</b> Plumbing system knowledge and its hazards <b>K2-</b> Identification of faults by checking shape and size of components and parts; Safety precautions <b>K3-</b> Methods of fault identification in plumbing components for systems <b>K4-</b> Component operation in a plumbing system</p>
<p><b>D3:</b> <b>Carry out corrective maintenance procedures</b></p>	<p><b>P1-</b> Dismantle faulty parts or components <b>P2-</b> Replace or repair faulty parts or components <b>P3-</b> Perform commissioning</p>	<p><b>K1-</b> Dismantling procedures <b>K2-</b> Replacing and repairing procedures <b>K3-</b> Commissioning procedures <b>K4-</b> Commissioning do will be engineer</p>
<p><b>D4:</b> <b>Complete work</b></p>	<p><b>P1-</b> Complete work related documents and procedures <b>P2-</b> Perform final quality inspection <b>P3-</b> Clean up and store tools, equipment and materials</p>	<p><b>K1-</b> Importance of documentation; Customer care procedures and techniques <b>K2-</b> Importance of quality; handing over to client <b>K3-</b> Waste disposal procedures; Care of tools and equipment</p>

**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
<b>E1:</b> <b>Plan and prepare for work</b>	<b>P1-</b> Identify and obtain safety and other regulatory requirements for excavation <b>P2-</b> Interpret and confirm layout plan <b>P3-</b> Mark out excavation <b>P4-</b> Identify and select tools and equipment	<b>K1-</b> Safety requirements; Specifications; Hazard identification <b>K2-</b> Drawings and symbols specifications <b>K3-</b> Marking out procedures <b>K4-</b> Tools and equipment and calibration thereof
<b>E2:</b> <b>Excavate according to plan</b>	<b>P1-</b> Check for safety hazards <b>P2-</b> Perform excavation <b>P3-</b> Install trench support	<b>K1-</b> Risk and hazards identification <b>K2-</b> Excavation procedures and techniques related to plumbing work; Safety precautions <b>K3-</b> Methods of trench support
<b>E3:</b> <b>Complete work</b>	<b>P1-</b> Complete work related documents and procedures <b>P2-</b> Perform final quality inspection <b>P3-</b> Clean up and store tools, equipment and materials	<b>K1-</b> Importance of documentation; Customer care procedures and techniques <b>K2-</b> Importance of quality; handing over to client <b>K3-</b> 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
<b>F1:</b> <b>Plan and prepare for work</b>	<b>P1-</b> Identify and select tools and equipment <b>P2-</b> Perform measurements	<b>K1-</b> Tools and equipment for fixing sanitary ware <b>K2-</b> Measuring units and conversions
<b>F2:</b> <b>Fix basic sanitary ware</b>	<b>P1-</b> Check for safety hazards <b>P2-</b> Mark out installation points and fixtures <b>P3-</b> Mount sanitary ware	<b>K1-</b> Risk and hazards identification <b>K2-</b> Marking out procedures; Type of fixtures; Safety precautions <b>K3-</b> Levelling procedures
<b>F3:</b> <b>Complete work</b>	<b>P1-</b> Complete work related documents and procedures <b>P2-</b> Perform final quality inspection <b>P3-</b> Clean up and store tools, equipment and materials	<b>K1-</b> Importance of documentation; Customer care procedures and techniques <b>K2-</b> Importance of quality; handing over to client <b>K3-</b> 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
<b>G1:</b> <b>Join fittings and pipes</b>	<b>P1-</b> Identify and select tools and equipment <b>P2-</b> Measure pipes <b>P3-</b> Cut pipes to length <b>P4-</b> Join pipes and fittings	<b>K1-</b> Tools and equipment for installing fittings and pipes <b>K2-</b> Marking out procedures <b>K3-</b> Cutting procedures <b>K4-</b> 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
<b>H1:</b> <b>Use plumbing tools and equipment</b>	<b>P1-</b> Identify and select tools, equipment and instruments <b>P2-</b> Demonstrate safe use of tools, equipment and instruments	<b>K1-</b> Purpose and application of plumbing tools, equipment <b>K2-</b> Use of plumbing tools, equipment and instruments
<b>H2:</b> <b>Perform bench work</b>	<b>P1-</b> Secure work piece firmly <b>P2-</b> Use metal processing tools to perform chip removal forming processes <b>P3-</b> Use metal processing tools to perform chip-less forming processes	<b>K1-</b> Hazard and risk identification; Safety requirements <b>K2-</b> Material properties <b>K3-</b> Material properties
<b>H3:</b> <b>Perform basic arc welding</b>	<b>P1-</b> Prepare materials <b>P2-</b> Perform arc welding	<b>K1-</b> Setting up jigs, fixtures or clamps <b>K2-</b> Welding equipment; Welding rods, settings, and consumables <u>for Arc welding safety gloves</u>
<b>H4:</b> <b>Maintain plumbing tools and equipment</b>	<b>P1-</b> Describe preventive maintenance procedures <b>P2-</b> Maintain and/or replace tool insulation <b>P3-</b> Clean and store plumbing tools, equipment and instruments	<b>K1-</b> Preventive maintenance; Types of maintenance schedules or programmes for: - Tools; Equipment; Machinery; Facilities <b>K2-</b> Types of insulation and reports <b>K3-</b> 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><b>A1:</b> <b>Basics of Solar Water Heating Applications</b></p>	<p><b>P1-</b> Define basics of solar water heating <b>P2-</b> Understand importance of solar water heating <b>P3-</b> Identify applications of solar water heating</p>	<p><b>K1-</b> Define water heating <b>K2-</b> Define fundamentals of solar collectors and Solar tubes Flat plates. <b>K2-</b> Types of water heating system <b>K3-</b> Applications of solar water heating system</p>
<p><b>A2:</b> <b>Overview of Domestic and Commercial Solar Water Heating Systems</b></p>	<p><b>P1-</b> Explain the basic functions of domestic solar water heating system <b>P2-</b> Identify types of solar water heating system <b>P3-</b> Analyze the water discharge level for domestic and commercial Water Heating Systems</p>	<p><b>K1-</b> Define water heating functions ,Solar system effects and Principle of heating <b>K2-</b> Market needs, purpose and requirements of domestic and commercial water heating <b>K3-</b> Measurement of water discharge <b>K4-</b> Equipment used for calculation of water discharge</p>
<p><b>A3:</b> <b>Commissioning, Operation and Maintenance of Domestic Solar Water Heating System</b></p>	<p><b>P1-</b> Follow safety and other regulatory requirements for Domestic Solar Water Heating System. <b>P2-</b> Interpret and confirm layout plan <b>P3-</b> Identify and select tools and equipment <b>P4-</b> Perform measurements <b>P5-</b> Conform to commissioning specifications <b>P6-</b> Conduct operational testing</p>	<p><b>K1-</b> Safety and regulatory requirements <b>K2-</b> Drawings and symbols <b>K3-</b> Tools and equipment for Commissioning, Operation and Maintenance <b>K4-</b> Measuring units and conversions <b>K5-</b> Commissioning procedures and specifications <b>K6-</b> 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	

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

<b>31</b>	Tester	
<b>32</b>	Testing pump (leakage)	
<b>33</b>	Tools box	
<b>34</b>	Torch	
<b>35</b>	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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