

National Vocational Certificate Level 3 in Plumbing cum Solar Water Heating Technology

Competency Standards



National Vocational & Technical Training Commission

5th Floor, Evacuee Trust Complex

Sector F-5/1, Islamabad

Tel: +92 51 904404

Fax: +92 51 904404

Email: info@navttc.org

Author:

Engr. Ghazanfar Abbas (Senior Manager Curriculum – PVTC), Mr. Arshad Hussain (Instructor - VTI Chakwal) , Mr. Shariq Rasheed (Jr. Instructor – VTI Jhamra)

Reviewed by:

Mr. Naeem Ahmad (Technical & Vocational Educationist VTI Abdul Hakeem) , Mr. Waqas Bin Tariq (Technical & Vocational Educationist Bahawalnagar) , Mr. Rizwan Maqbool (Technical & Vocational Educationist Multan) , Mr. Aamir Niaz (CEO / Owner, Choice Ideal Home Jhelum) , Mr. Waseem Shahzad (Dy. Manager MEP Izhar Constructions Lahore)

Layout and Design by:

Ms. Maria Arif (Freelance Consultant)

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Competency Standards: Plumbing cum Solar Heating Technician - Level 3

Competency Standard A: Apply knowledge of entrepreneurial ideas

Overview: This competency standard is intended to assist people in applying knowledge of entrepreneurial ideas and qualities. People holding credit for this competency standard are able to: Demonstrate knowledge of the requirements of entrepreneurs; conduct business start-up activities; develop a financial strategy; develop a marketing strategy; and implement and control business financial strategy

Competency Unit	Performance Criteria	Knowledge and Understanding
A1: Demonstrate knowledge of the requirements of entrepreneurs	P1- Identify the importance of entrepreneurs for Pakistan P2- Identify challenges of being an entrepreneur P3- Confirm and implement strategies for improving personal entrepreneurship qualities	K1- Types of verbal and non-verbal messages K2- Requirements and benefits of becoming an entrepreneur K3- Features of personal entrepreneurial assessment tools
A2: Conduct business start-up activities	P1- Select and secure business premises P2- Secure business operating clearance P3- Secure business support service	K1- Business premises requirements <ul style="list-style-type: none"> • Size • Location • Cost K2- Municipal guidelines and regulations K3- Application procedures
A3: Develop a financial strategy	P1- Estimate total cost of set up P2- Identify sources of funding P3- Estimate business expenses P4- Project profit and loss and cash flow P5- Establish and follow bank requirements	K1- Estimation and calculation K2- Conditions for funding K3- Basic accounting principles K4- Basic accounting principles K5- General bank requirements

<p>A4: Develop a marketing strategy</p>	<p>P1- Identify potential profitable opportunities and target markets P2: Plan service and product delivery P3: Identify competitors operating in the industry P4: Identify methods of promotion</p>	<p>K1- Estimation and calculation K2- Customer expectations and satisfaction K3- Principles of a competitive market K4- Basic promotional and/or marketing concepts</p>
<p>A5: Implement and control business financial strategy</p>	<p>P1- Implement financial control system P2- Prepare financial statements and interpret results P3- Prepare and implement periodic plans and budgets P4- Maintain business cash and general liquidity</p>	<p>K1- Basic financial concepts K2- Basic financial concepts K3- Basic financial concepts K4- Basic financial concepts</p>

Competency Standard B: Plan work and calculate cost

Overview: This competency standard is intended for skilled people in paid employment. People holding credit for this competency standard are able to: Interpret drawings, sketches and specifications; produce drawings and sketches; calculate material and labour cost.

Competency Unit	Performance Criteria	Knowledge and Understanding
B1: Interpret drawings, sketches and specifications	P1- Identify and obtain safety and other regulatory requirements as per job requirement P2- Interpret and confirm layout plan P3- Identify distribution points	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Drawings and symbols specifications
B2: Produce drawings and sketches	P1- Produce basic technical drawing and sketch P2- Dimension drawing and sketch correctly P3- Scale drawing and sketch	K1- Drawings and symbols specifications K2- Drawings and symbols specifications K3- Drawings and symbols specifications
B3: Calculate material and labour cost	P1- Identify location for installation P2- Estimate material requirements derived from produced drawing or sketch P3- Estimate labour cost for installation P4- Produce estimate of overall cost	K1- Location requirements K2- Estimation and calculation methods K3- Estimation and calculation methods K4- Estimation and calculation methods

Competency Standard C: Install solar heating appliances

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; install appliance; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
C1: Plan and prepare for work	P1- Identify and obtain safety and other regulatory requirements for installation P2- Interpret and confirm layout plan P3- Identify and select tools and equipment P4- Perform measurements	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment for installing fittings and pipes K4- Measuring units and conversions
C2: Install appliances	P1- Check for safety hazards P2- Join and install water stand, pipes and fittings P3- Conduct operational testing	K1- Risk and hazards identification K2- Joining techniques; Pipe and pipe fittings; Safety precautions K3- Knowledge of appliance
C3: 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: Install gas heating appliances

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; install appliance; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>D1: Plan and prepare for work</p>	<p>P1- Identify and obtain safety and other regulatory requirements for installation P2- Interpret and confirm layout plan for gas lamp and heater P3- Identify and select tools and equipment P4- Perform measurements</p>	<p>K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment for installing fittings and pipes K4- Measuring units and conversions</p>
<p>D2: Install appliances</p>	<p>P1- Check for safety hazards P2- Join and install pipes, fittings and accessories P3- Conduct operational testing</p>	<p>K1- Risk and hazards identification K2- Joining techniques; Pipe and pipe fittings; Safety precautions K3- Knowledge of appliance</p>
<p>D3: Complete work</p>	<p>P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials</p>	<p>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</p>

Competency Standard E: Install 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: Plan and prepare for work; assemble and install pipes and fittings; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>E1: Plan and prepare for work</p>	<p>P1- Identify and obtain safety and other regulatory requirements for installation P2- Interpret and confirm layout plan P3- Identify and select tools and equipment P4- Perform marking out and measure pipes P5- Cut pipes to length P6- Bend pipes</p>	<p>K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment for installing fittings and pipes K4- Marking out procedures K5- Cutting procedures K6- Bending procedures</p>
<p>E2: Assemble and install pipes and fittings</p>	<p>P1- Check for safety hazards P2- Join and install pipes and fittings P3- Perform levelling</p>	<p>K1- Risk and hazards identification K2- Joining techniques; Pipe and Sewerage pipe fittings; Safety precautions K3- Methods of levelling</p>
<p>E3: Complete work</p>	<p>P1- Complete work related documents and procedures P2- Perform final quality inspection P3- Clean up and store tools, equipment and materials</p>	<p>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</p>

Competency Standard F: Install 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; install sanitary ware; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
F1: Plan and prepare for work	P1- Identify and obtain safety and other regulatory requirements for installation P2- Interpret and confirm layout plan P3- Identify and select tools and equipment P4- Perform measurements	K1- Safety requirements; Specifications; Hazard identification K2- Drawings and symbols specifications K3- Tools and equipment for installing sanitary ware K4- Measuring units and conversions
F2: Install sanitary ware	P1- Check for safety hazards P2- Mark out installation points and fixtures P3- Perform modifications as required P4- Install sanitary ware and join pipes P5- Conduct operational testing	K1- Risk and hazards identification K2- Marking out procedures; Type of fixtures; Safety precautions K3- Problem solving K4- Joining techniques; Pipe and pipe fittings; Safety precautions K5- Product knowledge
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: Design, installations, commissioning, operation and maintenance of Solar Water Heating System

Overview: This competency standard is intended for those who carry out Design, 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 Planning, Installations of Domestic Solar Water Heating Systems, Commissioning, Operation and Maintenance of Domestic Solar Water Heating System and Cost and Financial Analysis of Domestic Solar Water Heating System).

Competency Unit	Performance Criteria	Knowledge and Understanding
A1: Basics of Solar Water Heating Applications	P1- Define basic solar water heating P2- Understand importance of solar water heating P3- Identify applications of solar water heating	K1- Define water heating K2- Define fundamentals of solar collectors and Solar tubes Flat plates. K2- Types of water heating system K3- Application of solar water heating system
A2: Overview of Domestic and Commercial Solar Water Heating Systems	P1- Explain the basic functions of domestic solar water heating P2- Identify types of solar water heating system P3- Analyze the water discharge level for domestic and commercial Water Heating Systems	K1- Define water heating functions ,Solar system effects and Principle of heating K2- Market needs, purpose and requirements of domestic and commercial water heating systems K3- Measurements of water discharge K4- Equipment used for calculation of water discharge
A3: Planning and Installations of Domestic Solar Water Heating Systems	P1- Draw solar water heater layout P2- Identify and select tools and equipment P3- Mark out excavation, installation and fixture P4- Install trench support P5- Join and install water stand, pipes and fittings P6- Perform excavation and installation	K1- Interpretation of drawing scale, symbols and specifications K2- Tools and equipment for installation K3- Marking procedures for excavation, installation and fixture K4- Methods of trench support K5- Jointing techniques for pipes and pipe fittings K6- Excavation procedures and techniques related to plumbing work with safety precautions

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	As per industry standard practice
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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I <http://www.navttc.org/>