

MICRO HYDRO POWER PLANT TECHNOLOGY

Competency Standards

National Vocational
Certificate Level 1

Version 1 - July 2015

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Competency Standards: Micro Hydel Power Plant operations (Helper) - Level 1

Competency Standard A: Maintain safety, health and cleanliness

Overview: This competency standard is intended to maintain health, safety and cleanliness in a variety of work contexts. People holding credit for this competency standard are able to: Identify risks in the workplace; follow cleanliness procedures to control risks; apply safe work procedures; and follow emergency procedures.

Competency Unit	Performance Criteria	Knowledge and Understanding
A1: Identify risks in the workplace	Trainee will be able to: P1- Identify and report health and safety hazards, and hygiene risks P2- Take action to reduce risk	K1- Types of hazards and risks in different workplace context K2- Risk control and assessment
A2: Follow cleanliness procedures to control risks	Trainee will be able to: P1- Apply workplace cleanliness procedures	K1- Personal and workplace hygiene
A3: Apply safe work procedures	Trainee will be able to: P1- Identify, functioning use and store personal protective equipment P2- Interpret safety signs and symbols	K1- Common personal protective equipment K2- Common safety signs and symbols
A4: Follow emergency procedures	P1- Identify and report to appropriate personnel P2- Carry out evacuation procedures P3- Perform basic fire fighting Procedure P4- provide basic first Aid procedure	K1- Emergency and evacuation procedures K2- Types of fires K3- Type and use of fire extinguisher K4- Basic First Aid procedure

Competency Standard B: Communicate in different work contexts

Overview: This competency standard is intended to apply basic communication skills in a variety of work contexts. People holding credit for this competency standard are able to: Gather, convey, and receive information; apply routine face-to-face communication; apply visual communication; and complete relevant work related documents.

Competency Unit	Performance Criteria	Knowledge and Understanding
B1: Gather, convey and receive information	Trainee will be able to: P1- Gather and respond verbal and written actions P2- Receive and respond verbal and written actions P3- Convey instructions P4- Clarify understanding by asking questions	K1- Types of verbal and non-verbal messages K2- Purpose and function of communication devices K3- Question techniques
B2: Apply routine face-to-face communication	Trainee will be able to: P1- Receive routine instructions P2- Follow routine instructions P3- Carry out procedures according to requirements P3- Access and interpret information from a range of sources P4- Complete verbal and/or written reporting	K1- Purpose of instructions K2- Purpose of set requirements K3- Different types of sources K4- Purpose of reporting; Types of reports
B3: Apply visual communication	Trainee will be able to: P1- Obtain and acknowledge attention of communicating parties P2- Clarify and confirm the intention of visual communication	K1- Methods of official correspondence K2- Visual communication skills

B4: Complete relevant work related documents	Trainee will be able to: P1- Complete range of forms P2- Complete job cards	K1- Examples of work forms and their purpose K2- Purpose of job cards
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Competency Standard C: Apply a problem solving method

Overview: This competency standard is intended to apply a problem solving method in a variety of work contexts. People holding credit for this competency standard are able to: Define a problem; choose a method for solving an identified problem; and apply the problem solving method.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>C1: Define a problem</p>	<p>Trainee will be able to:</p> <p>P1- Define problem in terms its nature, parties involved, and the effects it may have</p> <p>P2- Describe the problem in terms of ownership, responsibility, its sphere of influence and authority</p>	<p>K1- Problem solving methods:</p> <ul style="list-style-type: none"> • Brainstorming • Pros and cons • IDEAL • Research (may be omitted)
<p>C2: Choose a method for solving an identified problem</p>	<p>Trainee will be able to:</p> <p>P1- Describe problem solving method in terms of processes to be undertaken</p> <p>P2- Select and describe problem solving method in terms of its suitability</p>	<p>K1- Problem solving methods:</p> <ul style="list-style-type: none"> • Brainstorming • Pros and cons • IDEAL • Research (may be omitted)
<p>C3: Apply the problem solving method</p>	<p>Trainee will be able to:</p> <p>P1- Apply chosen method</p> <p>P2- Describe the outcome of the problem</p> <p>P3- Implement a conclusion to the problem</p>	<p>K1- Problem solving methods:</p> <ul style="list-style-type: none"> • Brainstorming • Pros and cons • IDEAL • Research (may be omitted)

Competency Standard D: Perform basic mechanical works using hand tools

Overview: This competency standard is intended for those who perform basic metal processing works using hand tools in a variety of contexts. People holding credit for this competency standard are able to: Plan and prepare for work; perform grinding operations; perform drilling operations; perform hand-saw cutting; perform thread cutting; perform filing; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
D1: Plan and prepare for work	Trainee will be able to: P1- Obtain job requirements from specifications P2- Identify auxiliary tools and/or equipment to carry out work processes in a safe manner P3- select auxiliary tools and/or equipment to carry out work processes in a safe manner P4- Identify and minimise hazards and risks associated with job requirements	K1- Safety procedures, including PPE K2- Types of holding devices K3- Properties of metal K4- Potential risks and hazards for self and other associated with metal processing
D2: Perform hand-saw cutting	Trainee will be able to: P1- Select saw and saw blade according to job requirements P2- Apply safe hand-saw cutting process P3- Check for conformance with job requirements	K1- Types and application of saw blades, and accessories K2- Saw cutting procedures K3- Safe working procedures
D3: Perform thread cutting	Trainee will be able to: P1- Select thread cutting tools & equipment according to job requirements P2- Apply safe thread cutting process P3- Check for conformance with job requirements	K1- Types and application of tap set, accessories, and lubricants K2- Thread cutting procedures K3- Safe working procedures
D4: Perform filing	Trainee will be able to: P1- Select appropriate file according to job requirements P2- Apply safe filing process	K1- Types and application of files K2- Use of marking and measuring tools K3- Safe working procedures

	P3- Check for conformance with job requirements	
D5: Complete work	Trainee will be able to: 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 K2- Importance of quality assurance K3- Waste disposal procedures; care of tools and equipment

Competency Standard E: Apply basic reading, writing and speaking skills in English in different life contexts

Overview: This competency standard is intended to assist people in applying basic reading, writing and simple speaking skills in English in different life contexts. People holding credit for this competency standard are able to: read texts used in different contexts; write texts for different contexts; and apply speaking and listening skills.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>E1: Read texts used in different contexts</p>	<p>Trainee will be able to:</p> <p>P1- Identify the purpose of text</p> <p>P2- interpret the purpose of text</p> <p>P3- Identify main ideas and/or key procedures in the text</p> <p>P4- interpret main ideas and/or key procedures in the text</p> <p>P5- Identify the meaning of key words and phrases in the text</p> <p>P6- interpret the meaning of key words and phrases in the text</p> <p>P7- Express opinions on the text or on its subject matter in a clear and simple manner</p>	<p>K1- Importance of written texts</p> <p>K2- Importance of correct interpretation of texts</p> <p>K3- Key words and key phrases</p> <p>K4- Explanation of text in a variety of contexts</p>
<p>E2: Write texts for different contexts</p>	<p>Trainee will be able to:</p> <p>P1- Use clear and simple English on familiar subjects</p> <p>P2- Apply planning processes</p> <p>P3- Apply drafting processes</p> <p>P4- Apply editing processes</p> <p>P5- Apply correct and coherent sequence and structure of information and/or ideas</p> <p>P6- Achieve reasonable comprehension of written text correct spelling, punctuation, and use of grammar</p>	<p>K1- Methods of simple English writing</p> <p>K2- Planning, drafting, and editing processes (may be omitted)</p> <p>K3- Summarising and paraphrasing of informed action</p> <p>K4- Principles of English grammar (may be omitted)</p>
<p>E3:</p>	<p>Trainee will be able to:</p>	<p>K1- Speaking and listening skills</p>

Apply speaking and listening skills	P1- Identify and interpret key points P2- Convey information in a clear and concise manner P3- Use speaking skills effectively P4- Use listening skills effectively	K2- Speaking and listening skills K3- listening skills K4- Speaking skills
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Competency Standard F: Apply basic numeracy skills in different life contexts

Overview: This competency standard is intended to assist people in applying basic numeracy skills in different life contexts. People holding credit for this competency standard are able to: Apply knowledge and conventions of common shapes to represent real life objects; Measure materials or objects; perform basic calculations associated with money, and time; use and create tables and graphs to represent and interpret public information; and apply simple formulae to solve arithmetic problems in real life contexts.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>F1: Apply knowledge and conventions of common shapes to represent real life objects</p>	<p>Trainee will be able to: P1- Identify and name common two and three-dimensional shapes P2- Represent two and three-dimensional shapes and objects in diagrammatic form P3- Assemble simple three-dimensional objects</p>	<p>K1- Types and terminology of common shapes K2- Differentiation between two and three dimensional shapes / objects K3- Differentiation between two and three dimensional shapes / objects</p>
<p>F2: Measure materials or objects</p>	<p>Trainee will be able to: P1- Identify and use measuring instruments P2- Apply simple formulae to calculate area and volume of regular shapes</p>	<p>K1- Types and purpose of measuring instruments K2- Units of measurement and abbreviations</p>
<p>F3: Perform basic calculations associated with money, and time</p>	<p>Trainee will be able to: P1- Perform simple calculations involving time P2- Convert fractions, decimals, and percentages P3- Perform simple calculations involving money</p>	<p>K1- Rounding techniques K2- Types of fractions K3- Rounding techniques</p>

<p>F4: Use and create simple tables and graphs to represent and interpret public information</p>	<p>Trainee will be able to: P1- Identify and interpret key features of everyday tables and graphs P2- Collect data in a table P3- sort data in a table P4- Record data in a table P5- Construct and label simple graphs</p>	<p>K1- Different types of simple tables and graphs K2- Preparation of basic data, tables & graphs K3- Meaning of graphs, such as increasing, decreasing, and constant value</p>
<p>F5: Apply simple formulae to solve arithmetic problems in real life contexts</p>	<p>Trainee will be able to: P1- Use simple formulae and algebraic expressions P2- Verify solutions to simple arithmetic problems</p>	<p>K1- Interpretation of simple formula & algebraic expression K2- Arithmetic problems and solutions</p>

Competency Standard G: Demonstrate positive workplace attitude and behaviours

Overview: This competency standard is intended to assist people in developing a positive attitude and behaviour in a work environment. People holding credit for this competency standard are able to: Apply knowledge of positive workplace attitude and behaviours; interact with people in the context of a work environment; and assess own professional behaviour in a work environment setting.

Competency Unit	Performance Criteria	Knowledge and Understanding
G1: Exhibit positive workplace attitude and behaviours	Trainee will be able to: P1- Describe proper dress code at work environment P2- Demonstrate positive listening skills at his level P3- Explain the concept of basic ethic	K1- Acceptable and unacceptable dress code K2- Basic listening Skills K3- Responsibility of the individual in the organization
G2: Interact with people in the context of a work environment	Trainee will be able to: P1- Describe the importance of first impression P2- Demonstrate interaction with people in a work environment setting P4- Demonstrate ways of behaving properly when provoked P5- Explain the importance of confidentiality	K1- Grooming, Attire K2- Basic Ways of greeting, introducing and interacting with people K4- Patience and tolerance K5- Confidentiality of: <ul style="list-style-type: none"> • Information • Material • Documents
G3: Assess own professional behaviour in a work environment setting	P1- Analyse personal behaviour in three different situations in a work environment P2- Measure personal behaviour against personal or company standards ie: Union, Labour	K1- Influencing factors in personal behaviour, e.g. <ul style="list-style-type: none"> • Anger • Stress • Depression K2- General code of conduct

Competency Standard H: Perform basic electrical works using hand tools

Overview: This competency standard is intended for those who perform basic electrical works using hand tools in a variety of contexts. People holding credit for this competency standard are able to: prepare for work; as per instruction, i.e., lay cables; joint cables and connections; and complete work etc.

Competency Unit	Performance Criteria	Knowledge and Understanding
H1: Prepare for work	Trainee will be able to: P1- Obtain job requirements from specifications/ instructions P2- Identify auxiliary tools and/or equipment to carry out work processes in a safe manner P2- select auxiliary tools and/or equipment to carry out work processes in a safe manner P3- Identify and minimise hazards and risks associated with job requirements	K1- Safety procedures, including PPE K2- Types of auxiliary tools and equipment K3- Potential risks and hazards for self and other associated with electrical works
H2: Lay cables	Trainee will be able to: P1- Prepare for installation of cables P2- Install conduit, GI pipes, PVC pipes and/or ducts P3- Pull cables in conduits	K1- Chiselling, ducting, PVC and GI pipe wiring procedures K2- K2- Laying procedure K3- Procedure of pulling cables
H3: Joint cables and connections	P1- Select jointing tools according to job requirements P2- Apply safe cable jointing process P3- Check for conformance with job requirements	K1- Types of different jointing methods: - tin, crimped terminals - ferrules and shrinking nut - bolt & screw terminal K2- Jointing procedures K3- Safe working procedures
H4: Complete work	P1- Complete work related documents and procedures P2- Perform final quality inspection at work environment.	K1- Importance of documentation K2- Importance of quality assurance

	P3- Clean up and store tools, equipment and materials	K3- Waste disposal procedures; care of tools and equipment
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Competency Standard I: Perform basic civil construction works using hand tools

Overview: This competency standard is intended for those who perform basic civil construction works using hand tools in a variety of contexts. People holding credit for this competency standard are able to: Plan and prepare for work; perform measurements; perform excavations; and complete work.

Competency Unit	Performance Criteria	Knowledge and Understanding
<p>I1: Prepare for work</p>	<p>Trainee will be able to:</p> <p>P1- Obtain job requirements from specifications/ Instruction</p> <p>P2- Identify auxiliary tools and/or equipment to carry out the job</p> <p>P3- Select auxiliary tools and/or equipment to carry out work processes in a safe manner</p> <p>P4- Identify hazards and risks associated with job requirements</p> <p>P5- Minimise hazards and risks associated with job requirements</p>	<p>K1- Safety procedures, including PPE</p> <p>K2- Types of auxiliary tools and equipment</p> <p>K3- Potential risks and hazards associate with construction works</p>
<p>I2: Perform measurements</p>	<p>Trainee will be able to:</p> <p>P1- Select measuring tool according to job requirements</p> <p>P2- Apply suitable measuring process</p> <p>P3- Check for conformance with job requirements</p>	<p>K1- Types and application of measuring tools</p> <p>K2- Measuring procedures</p> <p>K3- Safe working procedures</p>
<p>I3: Perform excavation</p>	<p>Trainee will be able to:</p> <p>P1- Select excavation hand-tools according to job requirements</p> <p>P2- Apply excavation process</p> <p>P3- Check for conformance with job requirements</p>	<p>K1- Types and application of excavation tools</p> <p>K2- Excavating procedures</p> <p>K3- Safe working procedures</p>

<p>I4: Complete work</p>	<p>Trainee will be able to: P2- Perform final quality inspection at work environment P3- Clean up and store tools, equipment and materials</p>	<p>K1- Importance of documentation K2- Importance of quality assurance K3- Waste disposal procedures; care of tools and equipment K4- Procedure of storing equipments</p>
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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

Tools and Equipment:

No.	Description	Quantity
	Tools	
	Mechanical	
1	7 pieces screwdriver set	
2	Adjustable wrench set	
3	Allen Keys Set	
4	Aluminum Spirit Level (leveling instrument)	
5	Bastard File with wood handle (Flat)	
6	Bastard File with wood handle (Round)	
7	Bench Vice	
8	Bench Workstation	
9	Chisel	
10	Clamp Meter	
11	Claw hammer with wood handle	
12	Combination Pliers	

13	Crimping Tool	
14	Hack Saw with Blades	
15	Hand Drill [1/8" – 1/8"]	
16	Hand Grease Gun	
17	Hand Grinding Machine	
18	Hot Air Blower	
19	Measuring tape	
20	Micro Meter [Screw Gauge]	
21	Nose Plier	
22	Oil Can	
23	Pedestal Drill	
24	Pen Grinder	
25	Pipe Wrench [18" & 24"]	
26	Portable Welding Plant [100 – 300 Amperes]	
27	Puller	
28	Punch Set	
29	Retched Block with Grip	
30	Screw Driver Set (-)[6"-18"]	
31	Screw Driver Set (+) [6"-18"]	
32	Side Cutting Plier	
33	Spanner Set (Open)	
34	Spanner Set (Ring)	
35	Stainless Steel Slogging Ring Spanner	
36	Thread Gauge	

37	Tong/Monkey Plier	
38	Vernier Calliper	
39	Wheel Grinder	
40	Wire Gauge	
41	Welding Plant	
	Electrical	
1	Clamp Meter	
2	Combination Plier	
3	Earth Tester	
4	Line Tester	
5	Megger	
6	Multi Meter	
7	Nose Plier	
8	Pin Plier	
9	Screw Driver Set	
10	Side Cutter	
	Safety Tools	
1	Fire Extinguisher	
2	First Aid Box	
3	Hand Gloves	
4	Hard top Hat	
5	Mask	
6	Overall combination [Dress]	
7	Safety Belt	

8	Safety Goggles	
9	Steel Toe Shoes	
<u>EQUIPMENT</u>		
Civil		
1	Air Vent Pipe	
2	Bell Mouth	
3	Control Gates	
4	Control Valves	
5	Expansion Joint	
6	Flanges	
7	Flushing Gates	
8	Flushing Pipe	
9	Penstock	
10	Reducer	
11	Rubber Seal	
12	Trash Rack	
Electrical		
1	Ballast Tank with Heaters	
2	Binding wire	
3	Cable Shoe	
4	Channel Iron	
5	Conductors	
6	D-Iron Set	
7	Disc Insulator [With Tension Set]	

8	Earth Wire	
9	Earthing Plate	
10	Electrical Panels	
11	Electronic Load Controller	
12	Energy Meter	
13	Generator[Brushed and Brush-less]	
14	Metal Clad Main Switch	
15	Pin Insulator	
16	Pole	
17	Power Cable	
18	Pressure Transducer	
19	Shackle Insulator	
20	Stay Insulator	
21	Stay Plate	
22	Stay Rod	
23	Stay Wire	
24	Thimble	
25	Transformer	
26	Turn Buckle	
27	Ultra Sonic Flow Meter	
	Mechanical	
1	Angle Iron [Cross Arm]	
2	Butterfly Valve	
3	Coupling [Flexible/Rigid]	

4	Crossflow Turbine	
5	Flat Belt	
6	Flat Pulleys	
7	Fly Wheel	
8	Francis Turbine	
9	Gate Valve	
10	Gear Box	
11	Governor	
12	Hydraulic Jack	
13	Operating Rod	
14	Pelton Turbine	
15	Propeller/Kaplan Turbine	
16	Single Phase Variac [Auto Transformer]	
17	Tachometer	
18	V Belt	
19	V-Pulleys	

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